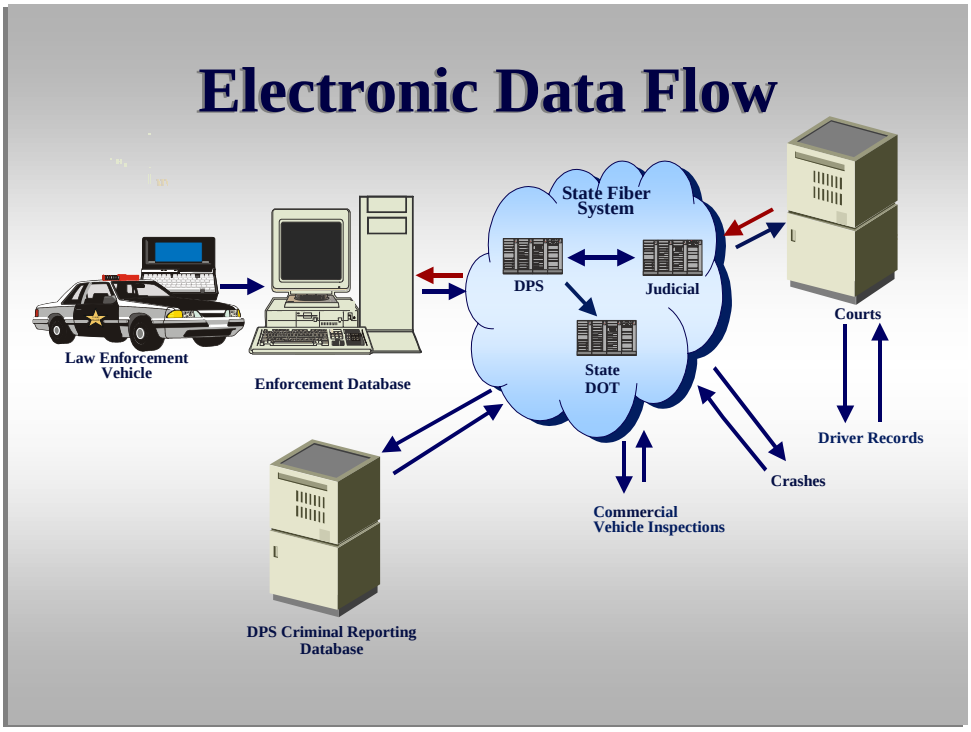
Initiatives to Address Improving Traffic Safety Data



National Highway Traffic Safety Administration
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EXECUTIVE SUMMARY

Despite significant gains since the enactment of federal motor vehicle and highway safety legislation in the mid 1960's, the annual toll of traffic crashes remains tragically high. In 2003, 43,220 people were killed on the nation's highways and an additional 2.89 million people suffered serious injuries.[1] Motor vehicle crashes are the leading cause of death and disability in the United States for 2 year olds and people of every age from 4 through 33.[2] Furthermore, traffic crashes are not only a grave public health problem for our nation, but also a significant economic burden. In 2000, traffic crashes cost our economy approximately $230 billion, or 2.3 percent of the U.S. Gross Domestic Product.[3]

Traffic safety data is the primary source of our knowledge about the traffic safety environment, human behavior and vehicle performance. Therefore, in order to address these safety problems, we require good data, meaning that data which are timely, accurate, complete, uniform, integrated and accessible. The U.S. Department of Transportation's (U.S.DOT) National Highway Traffic Safety Administration (NHTSA) has made improving traffic safety data one of the agency's highest priorities.

In the fall of 2003, NHTSA formed a multidisciplinary integrated project team (IPT) -- comprised of representatives from NHTSA headquarters and the regions, the Bureau of Transportation Statistics (BTS), Federal Highway Administration (FHWA), and the Federal Motor Carrier Safety Administration (FMCSA)-- to address the role of data in achieving U.S.DOT's Safety Strategic Objective: "Enhance public health and safety by working toward the elimination of transportation-related deaths and injuries." The team consulted experts in the field, including those from the States and in academia, in order to develop priorities and recommendations for NHTSA's Administrator about the best methods for obtaining the information needed to promote traffic safety. The team's mandate was specifically to identify data gaps and outline how data and related processes could be improved to address the increasing complexity of traffic safety and vehicle issues. The final report focuses on data that are routinely collected, accessible, and widely used to meet traffic safety data needs. Improving these data will benefit the traffic safety community and the public at large.

The effectiveness of informed decision making at the national, State and local levels, involving sound research, programs and policies, is directly dependent on data availability and quality. Accurate and comprehensive, standardized data provided in a timely manner, would allow the agency or decision-making entities at the State or local levels to:

- Determine the causes of crashes and their outcomes
- Evaluate strategies for preventing crashes and improving crash outcomes
- Support traffic safety data operations
- Measure progress in reducing crash frequencies and severities
- Update traffic safety policies

This report presents an in-depth look at routinely collected and accessible traffic safety data and provides initiatives and recommendations for federal and State stakeholders to improve traffic safety data needed to reduce deaths, injuries, injury severity and costs. The recommendations articulate the direction and steps needed for the data to be improved and more useful to all stakeholders involved.

Overview Of Recommendations To Improve Traffic Safety Data

Each of the categories below illustrates the steps needed in order for traffic safety data and related processes to be improved. Clearly there are recommendations which are of little or no cost to either the federal government or the States, just as there are those which will be very expensive, and some in between. State Traffic Records Coordinating Committees (TRCCs) will use their priority plans and available resources to guide decisions to fund more costly activities. NHTSA and its federal partners will focus primarily on those recommendations that are currently feasible --given current resources -- with the understanding that when budgets and other resources allow, the more costly recommendations can be pursued as appropriate.

Beneath each category is a brief synopsis of its status at both the federal and State levels. (The report goes on to outline in some detail both the proposed initiatives and recommendations, listed in order of priority, for both levels.)

A. Coordination and Leadership

The recommendations in this section are aimed at strengthening the coordination and leadership needed to improve traffic records. TRCCs will function at the State and federal levels to overcome organizational obstacles and ensure effective use of available resources. The TRCC at the federal level, the U.S.DOT Highway Safety TRCC, must lead by example and demonstrate to the States the benefits of a coordinated approach. The federal and State TRCCs must exert strong leadership to market the importance of the role of better data in improving highway safety, ensure funding for this important task, and emphasize the benefits of using existing technologies.

B. Data Quality and Availability

These recommendations are aimed at improving the quality and completeness of federal data, improving, as resources permit, the quantity and timeliness of federal data, and filling the data gaps in early warning reporting, citation tracking, non-traffic deaths, off roadway traffic deaths and exact location data. Existing initiatives, already funded, are recommended for continuation to fill in some of these gaps. State level traffic safety databases—including the amount and accuracy of data captured – continue to need to be enhanced and the data quality improved in order to meet data users' needs.

C. Electronic Technologies and Methods

These recommendations are aimed at encouraging States to move from paper-laden, labor-intensive traffic records processes to electronic capture and processing. States are also encouraged to recognize and take advantage of electronic data to advance real-time decision-making, reduce the burden of data collection, improve data quality, facilitate transfer, merging and sharing, and make data available sooner.

D. Uniform and Integrated Data

These recommendations are aimed at encouraging more uniformity in the data elements, e.g. the Model Minimum Uniform Crash Criteria (MMUCC)[4] data element names, definitions and attributes at the State level and uniform EDR data are the federal level. In addition, linkage of State data systems is encouraged to improve and expand their usefulness.

E. Facilitated Data Use

These recommendations are aimed at facilitating data access and use. In addition they emphasize the importance of training courses and tools so that people can use the data more easily and effectively.

NHTSA believes its own initiatives, in conjunction with the recommendations for both a U.S. DOT Highway Safety Traffic Records Coordinating Committee and for the States, will lead to both short term and long term solutions to improve data and maximize its use to achieve key DOT safety objectives.

I. INTRODUCTION

The mission of the National Highway Traffic Safety Administration (NHTSA) is to save lives, prevent injuries and reduce traffic-related health care and other economic costs. The agency develops, promotes and implements effective educational, engineering, and enforcement programs aimed at ending preventable tragedies and reducing the economic costs associated with motor vehicle use and highway travel.

As an integral part of the U.S. Department of Transportation (U.S.DOT), NHTSA improves public health and enhances the quality of life in America's communities by helping to make highway travel safer. The agency uses a multi-disciplinary approach that draws upon diverse fields, including epidemiology, biomechanics, social sciences, human factors, economics, education, law enforcement and communication science, to address one of the most complex and challenging public health problems facing our society.

The agency regulates motor vehicle and original equipment manufacturers through its safety standards program; performs and funds critical research to assess the safety impact of advanced technologies; spurs progress in harmonizing international safety standards; and conducts innovative projects to improve traffic and motor vehicle safety. NHTSA incorporates multiple aspects of engineering, education, enforcement and evaluation into its programs, which are designed to address the challenges of crash and injury prevention involving people, vehicles, and the roadway environment.

Data are fundamental to the success of all of these activities: The effectiveness of informed decision making at the national, State and local levels, involving sound research, programs and policies, is directly dependent on data availability and quality. Without accurate and comprehensive data, it is not possible to determine causation or to develop countermeasures that will prevent crashes or mitigate the injury consequences of the crashes that do occur. This report presents an in-depth look at routinely collected and accessible traffic safety data and provides initiatives and recommendations to improve traffic safety data needed to reduce deaths, injuries, injury severity and costs. However, we must caution that several of these recommendations are contingent upon available resources, especially funding appropriations for NHTSA and its partners within the Department of Transportation, which must be approved by the U.S. Congress.

In addition to traffic safety data, NHTSA identified four other highway safety areas with substantial potential for reducing traffic fatalities and injuries: alcohol-impaired driving, vehicle compatibility, rollover mitigation and safety belt use. Integrated project teams (IPTs) developed each of these reports from in-depth reviews in each priority area. The reports are available on NHTSA's Web site at http://www.nhtsa.dot.gov/people/iptreports.html and also on U.S.DOT's docket management system (DMS) at http://dms.dot.gov/. The docket numbers for each of the respective reports are as follows:

- Safety Belt Use NHTSA-2003-14620;
- Impaired Driving NHTSA-2003-14621;
- Rollover Mitigation NHTSA-2003-14622;
- Vehicle Compatibility NHTSA-2003-14623;
- Data NHTSA-2004-17339.

II. HIGHWAY SAFETY OVERVIEW

Despite significant gains since the enactment of Federal motor vehicle and highway safety legislation in the mid 1960's, the annual toll of traffic crashes remains tragically high. In 2003, 43,220 people were killed on the nation's highways and an additional 2.89 million people suffered serious injuries.[5] Motor vehicle crashes are the leading cause of death and disability in the United States for 2 year olds and people of every age from 4 through 33.[6]

Traffic crashes are not only a grave public health problem for our nation, but also a significant economic burden. In 2000, traffic crashes cost our economy approximately $230 billion, or 2.3 percent of the U.S. Gross Domestic Product.[7] This translates to an annual average cost of $820 for every person living in the United States. Included in this figure is $81 billion in lost productivity, $32.6 billion in medical expenses, and $59 billion in property damage. The average cost for a critically injured survivor of a motor vehicle crash is estimated at $1.1 million over a lifetime.[8] However, this figure does not reflect the significant physical, social and psychological burdens borne by crash victims and their families.[9]

III. INTEGRATED PROJECT TEAM FORMATION

NHTSA created the Data Integrated Project Team (IPT) in September 2003, pursuant to U.S.DOT's Safety Strategic Objective: "Enhance public health and safety by working toward the elimination of transportation-related deaths and injuries," [10] and in recognition of the importance of data in achieving that goal. The Data IPT was asked to recommend priorities to NHTSA's Administrator on the best methods for obtaining the information needed to promote traffic safety and, specifically, to identify how data could be improved to address the increasing complexity of traffic safety and vehicle issues.

Scope: Since the topic of traffic safety data covers a broad spectrum, the Data IPT was charged to focus on data that are, or have the potential to be, routinely collected, accessible, and widely used to meet traffic safety data needs. These data are the primary source of our knowledge about the traffic safety environment, human behavior and vehicle performance and meet the requirement to address data needed for both traffic safety and vehicle issues. They are also continuously collected and have the widest use by different types of data users for multiple purposes at the local, State and national levels. Improving these data will benefit the traffic safety community, as well as the public at large.

For the purposes of this report, "routinely collected" and "accessible" traffic safety-related data refer to the following three types of data:

1. Crash and non-crash motor vehicle-related events that directly result in property damage and/or deaths, injuries and their health care costs. These data may be collected at different times and locations beginning at the scene and continuing, for injured persons, through the health care system until a victim is discharged. They describe the persons, vehicles, environments and outcomes that are involved.

2. Other events that result from regulations/policies designed to support traffic safety-related enforcement and prevention functions. These functions include documenting a traffic stop, licensing a driver, registering a vehicle, issuing a citation, and adjudicating violations.

3. Other types of data such as roadway inventory and exposure data.

Limitations to the Scope: The Data IPT made no recommendations regarding data that are routinely collected, yet not accessible to the public, or any regarding non-routinely collected data, such as those created as part of specific research studies or opinion surveys.

Approach: Data IPT members (Appendix A-1) included representatives from BTS, FHWA and FMCSA. The team began by discussing the main traffic safety data issues in their areas of expertise. After this process, they obtained valuable input on these issues from both State and national experts (Appendix A-2) to better understand current and future needs for traffic safety data, as well as the technological, administrative and political barriers that prevent resolution of existing traffic safety data problems. This report and its recommendations are the result of the expertise of the Data IPT members, the experts whom they interviewed, and the informational materials they reviewed. The Data IPT concluded that State and national Traffic Records Coordinating Committees (TRCCs) should determine *how* any recommendations should be implemented, in order to ensure coordination both statewide and nationally.

A. Vision for Electronic Traffic Safety Data Collection

To reach the heart of the U.S.DOT safety goal, reducing transportation-related fatalities and injuries, the traffic safety community needs both vehicle and traffic safety information to:

- Determine the causes of crashes and their outcomes
- Evaluate strategies for preventing crashes and improving crash outcomes
- Support traffic safety data operations
- Measure progress in reducing crash frequencies and severities
- Update traffic safety policies

To adequately support these activities, the traffic safety community needs traffic safety information that is generated from good data, defined as data that are timely, accurate, complete, uniform, integrated, and accessible (see Appendix B). Awareness has increased, with each advance in computer technology, that electronic data move faster than data collected on paper, become more uniform to facilitate integration, and improve in quality as use increases over time.

The most efficient strategy for improving traffic safety data is to change from the existing paper-laden, labor-intensive approach to electronic collection and transfer during, or as close as possible to the traffic safety event, whether that event is a crash, a traffic stop, vehicle registration, driver licensing, issuance or adjudication of a citation. This one change alone will have the most impact on generating and ensuring good data. Electronic data collection generates timely data. It permits automatic editing at the time of collection, when the data collector is present, so that the data will be more accurate, complete and, thus, immediately useful. Uniform data facilitate compilation, transmission, and integration. Finally, electronic data provide easier access for the data users.

Electronic data collection technology exists that can handle the diverse types of traffic safety data. Vehicle sensors, long-range radar, optical sensors, lane detection and the vehicle event data recorder (EDR) systems will provide data about crash avoidance and causation. The changes in vehicle speed before and at the time of the crash, the principal direction of force and the exact latitude and longitude of the crash location will be collected in conjunction with the vehicle's automatic crash notification (ACN) and global positioning systems (GPS). A medical urgency algorithm will electronically convert this information into an injury severity indicator.

At the scene, infrared or "smart card" technology will scan or swipe electronic driver license and vehicle registration data into a handheld device, such as a Personnel Data Assistant (PDA), tablet, clipboard, or laptop. The handheld device will directly access the driver and vehicle in a few seconds, the electronic data will generate any outstanding warrants related to the driver license, vehicle registration and/or license plate.

The handheld device will generate the case number, date, time, and latitude/longitude when the crash report is initiated. EDR data will be entered along with the "swiped or scanned" license and registration data. Drop-down menus, optical character recognition, speech recognition, intelligent screens and other technologies as well as linkage to other appropriate databases, such as the roadway database, and built-in logical and validity data edits will ensure accuracy. Driver and vehicle data will be simultaneously uploaded or downloaded into a mobile data terminal to update the history files at the State DMV. Citation data will be integrated with the driver and vehicle data to justify revocations and then transferred to update data at the Court of Jurisdiction, the State DMV, and the local command unit. At the time of transfer, portions of the crash report will be flagged for completion, update, or correction. A sustained effort is required to improve data, so this future vision of electronic traffic safety data collection will also serve as a general guideline to assist the traffic safety community in remaining focused as important milestones are gradually achieved over time.

IV. PROBLEM IDENTIFICATION FOR TRAFFIC SAFETY DATA

Data are required to maintain and improve vehicle and traffic safety. Beginning with the Intermodal Surface Transportation and Efficiency Act of 1991 (ISTEA)[11] and continuing with each subsequent reauthorization, the U.S. Congress has placed a high priority on data-driven performance management and strategies with outcome-oriented goals and measures. The Data IPT used the outcome-oriented Haddon Matrix[12] to define the data needs of the traffic safety community and identify any gaps or challenges in existing data. The matrix takes an epidemiological approach to analyzing motor vehicle crashes, dividing the crash event variables into three phases: pre-crash, crash, and post-crash. This approach helped identify gaps and challenges at both the federal and State levels in traffic safety data capture, content, amount, quality and other important characteristics affecting data collection, processing, and analysis**.**

Specific data problems and gaps are discussed below, beginning with the routinely collected and accessible data at the federal level. The gaps identified in these data are discussed in terms of what is needed to meet the needs of the data users. At the State level, data problems are described that relate to the difficulty collecting, transferring, and using data to track a traffic safety event and the use of these data to populate national databases at the federal level. Finally, the main challenges to the

resolution of these data problems are identified at both the federal and the State levels, followed by an explanation of how implementing existing technologies can make it worth addressing these issues.

A. Federal Data Issues

The routinely collected and accessible federal data are meant to help meet data users' needs for information about vehicle crashworthiness and potential design defects, the biomechanics of the injuries that occur, the type and severity of the injury, and the actual causes of the crash[*]. The gaps here were consistently identified, and assigned a high priority for being addressed, by both agency and outside experts interviewed for this report.

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1. Pre-crash Conditions

There are very limited data about how a crash occurs. While much has been done to improve the crashworthiness of vehicles and fatality rates have declined over time, the number of fatalities and injuries remain fixed at disconcertingly high levels. Primary prevention is critical; however, nearly 30 years have passed since the last crash causation study was conducted. A new on-scene data collection study is urgently needed to obtain "fresh" data from real-time observations and interviews. These data would allow researchers to identify primary causation factors and begin finding ways to prevent crashes from occurring by testing new initiatives for crash avoidance or countermeasure programs.

a. Crash Causation Studies

In an effort to obtain more pre-crash crash causation information for large trucks, the FMCSA and NHTSA sponsored the *Large Truck Crash Causation Study* that routinely collected causation data about large truck crashes over a three-year period. This study used trained data collectors to ask open-ended questions of the occupants at the crash scene about the usual and unique events that occurred. The opportunity to be at the scene immediately after the crash allowed interviews with (less injured) motorists, who provided significant pre-event driver action information. The data collectors also took photographs and observed physical evidence, such as fatigue, phone use, and receipts of purchases to validate the self-reported data. The information generated by the interviewers, law enforcement, and from other sources was then used to determine the actual sequence of events leading to the crash. The data, currently in the final phase of coding and quality control, are scheduled for release in the first quarter of 2005. Public access will be similar as for the final National Automotive Sampling System—Crashworthiness Data System (NASS-CDS) case files (e.g. access through the NHTSA website to download the SAS file), and for viewing the sanitized individual case reports.

b. Event Data Recorder (EDR) Data

The EDR is a function within the device used in most light motor vehicles to control airbag deployment and other critical safety features. The EDR function is evolving into a powerful

[*] While NHTSA is not currently able to determine the *causes* of crashes, with more objective and subjective data it would be more feasible to do so. Meanwhile, the agency has data that report on the *contributing factors* of crashes.

mechanism for collecting crash information. Currently, NASS-CDS, the Special Crash Investigations (SCI) and Crash Injury Research and Engineering Network (CIREN) routinely collect EDR data on certain model vehicles using a commercially available tool to download vehicle factors such as the delta-V, pre-crash speed (mph), engine speed (rpm), throttle percentage and brake on/off switch, in addition to data related to belt utilization and airbag deployment. The EDR is the only source of information about advanced air bag characteristics and timing issues associated with airbag deployment and non-deployment events.

The variability between manufacturers with respect to air bag controllers and EDRs is tremendous. Data collection format, the amount of data collected, and method of data extraction are just a few of the areas where differences occur. In fact, some vehicles do not record any information. Downloading EDR data can be complicated because of the vehicle variability and damage caused by the crash. Two methods have evolved to download EDR data. One uses the vehicle's data "bus," an electronic system that connects the various computers and sensors in a similar fashion that office computers are interconnected using a local area network (LAN). The other utilizes direct connection to the air bag control box. Each manufacturer uses different style connectors, thus complicating the download process.

EDR data have inherent limitations, and thus should be thought of as an additional resource to the investigator, not an absolute indication of circumstances. For example, an EDR would record a speed of zero mph for a vehicle moving 60 mph with its brakes locked as it slid over a patch of ice just prior to a crash. As it exists today, safety belt indicators would show buckled even if the belt were behind the driver's back, because the system senses the latch connection, not the actual use of the safety belt system. Standardization of the EDR data, resolution of the problems transferring the data from the EDR, and ensuring that the indicators accurately reflect crash conditions are necessary. In June 2004, NHTSA proposed standard requirements for EDRs that manufacturers choose to install in light vehicles. (See Section D. Uniform and Integrated Data, Federal Recommendation #2.)

2. Crash Data

a. Sample Size

NHTSA's NASS-CDS sample of routinely collected and accessible detailed crash investigation data provide a source of real crash data that are necessary in the development of new motor vehicle safety standards, the evaluation of existing standards, and the identification of potential safety-related defects. However, due to budget constraints and other factors, the sample has shrunk to 27 Primary Sampling Units (PSUs) and 4800 cases, which represents a third of the size originally recommended when the survey was designed. Due to the small size of this current sample, it now takes multiple years of data to reveal a safety problem among the many different types of vehicles involved. As a result, NHTSA sometimes has difficulty providing timely information about the performance of specific types of vehicles or vehicle equipment when needed to support rulemaking or enforcement.

b. Location Data

Use of latitude and longitude coordinates (global positioning systems (GPS)) enables location to be standardized for all traffic safety applications using geographic information systems (GIS). Most States have at least one layer of GIS base maps to collect location data. However, GIS efforts may

vary by State. While latitude and longitude coordinates allow most data to be linkable, crossing State lines may pose a problem. Some GIS systems do not include local roads, despite the fact that these are the location of many of the preventable fatalities and serious injuries. Characteristics of a roadway, such as hardware, are usually included only for State highways. An exception is the locations of all bridges, which eventually will be identifiable by latitude/longitude because of their inclusion in the National Bridge Inventory, which is maintained by the FHWA. Federal guidelines may be needed to indicate where or at what level of precision latitude/longitude should be measured for traffic safety purposes.

c. Access and Usability

Data users have expressed appreciation of the usefulness of recent federal data initiatives. They described how considerable time has been saved by being able to view NASS cases which are only a few months old, rather than having to wait until "close out" when the cases could be 18 months old or more. In addition, having the NASS-CDS, General Estimates System (NASS-GES) and SCI share a common platform allows data users to obtain a hardcopy of cases of interest in days rather than weeks, on CD or in print, with all forms, images and sketches. The ability to choose the format is much appreciated. As a result, the data are used more and data users describe themselves as more reliant on this data.[*]

However, federal data have been criticized for limitations to data access, with requests from data users for the implementation of plain language queries to allow data users to refine case selection. They have also called for more State data in the State Data System (SDS), so that eventually all 50 States and the territories are included, and have requested more information, training and opportunities to provide feedback about available federal data.

3. Post Crash, Non-Crash, And Non-Roadway Crash Data

a. Blood Alcohol Concentration (BAC) Data

Accurate, complete BAC data in fatal crashes are critical for problem identification, countermeasure development, and evaluation. However, in 2000, BAC data were missing for almost half of the drivers included in the FARS, reflecting the diverse testing policies and practices in the States. When BAC data are missing, State totals are incomplete, requiring additional time and expense for NHTSA to impute the missing BAC data to provide federal fatality totals. As a solution, NHTSA conducted a study, *State Laws and Practices for BAC Testing and Reporting Drivers Involved in Fatal Crashes in* 10 States with below average reporting rates. These States were selected to identify why the reporting rates to FARS were so low. The second phase of the study, *State Demonstration Program to Improve Blood Alcohol Concentration (BAC) Testing and Reporting on Drivers Involved in Fatal Crashes*, involves taking the lessons learned and demonstrating in three States how to improve the BAC testing of deceased and surviving drivers involved in fatal crashes and improving the reporting of the BAC results to FARS.

[*] The CIREN cases also reside on the same platform as the NASS and SCI cases but it is necessary to restrict access to these cases to protect medical privacy. Public access to sanitized CIREN cases is provided via the CIREN website at http://www-nrd.nhtsa.dot.gov/departments/nrd-50/ciren/CIREN.html

b. Non-Crash Motor Vehicle-Related Injury and Fatalities

Non-crash events that involve fatalities and injuries caused by motor vehicles do not represent a large volume of cases on an annual basis but may be preventable through government regulation. Data on these types of events are not routinely collected and accessible at the State or national level because different agencies have different legislated mandates. FMCSA needs information about heart attacks because the agency regulates licensure for commercial drivers with medical conditions. NHTSA needs non-crash data that relate to the potential need for vehicle safety standards. For example, information about injuries related to automatic windows, roll-aways and backing crashes involving children, could support needed safety rulemaking.

Some non-crash motor vehicle-related injury and fatality data are available from routinely collected and accessible data not associated with traffic safety, but these data may be useful to describe particular types of crashes or injuries. For example, routinely collected and accessible Statewide hospital discharge data, abstracted from emergency department, inpatient and other hospital records, include an "E-code" to indicate a motor vehicle as the external cause that can be used to generate information about some types of non-crash motor vehicle-related events. In addition, the National Electronic Injury Surveillance System (NEISS) data collected by the U.S. Consumer Products Safety Commission (CPSC) provide some useful information about motor vehicle-related injuries, though most data do not fit traffic safety definitions. Special data routinely collected by race car associations provide statistics about injury patterns resulting from different forces acting on the race car occupant during a crash. Test vehicle data collected by automobile manufacturers can reveal facts about maneuvering and braking patterns for new types of vehicles.

Additionally, NHTSA needs information about non-crash motor vehicle-related injury and fatalities in terms of alcohol offenses, as well as citations and fines issued for safety belt violations. Because these events occur infrequently, special studies are a more efficient data collection method.

c. Fatal Crash-Involved Vehicles That Are Off the Roadway*

Data are needed about the types and characteristics of vehicles that are off the roadway but involved in a fatal crash. Generally, the event is captured in FARS and the death is counted, but no information is recorded about the type of vehicle that is "off the roadway." These events can occur where the vehicle is a parked car, school bus, motor coach, snowplow, road grader, etc., and not considered "in transport." There is a recurrent interest in this information to support vehicle safety rulemaking, for example, related to fuel tank fires involving off-the-road vehicles.

4. Data That Are Routinely Collected But Not Routinely Accessible

The following data are routinely collected but are not routinely accessible to the public or researchers because of the complexity of the sampling design and/or the difficulty using the massive amounts of data collected. Instead, the data are analyzed internally and the results published in reports. Although these data are important, they are beyond the scope of this report.

a. Naturalistic Study of Driver Behavior

* For FARS, "off the roadway" refers to only those vehicles parked alongside a road or highway. This would not include parking lots or other private property where a vehicle may be parked.

Because of the difficulty predicting when a crash will occur, it is difficult to routinely collect data about driver actions that are crash related. Naturalistic studies inevitably generate large quantities of data between crashes to obtain the significant crash-related information. The raw data are unmanageable for public access. NHTSA has initiated the Intelligent Vehicle Initiative to determine the feasibility of developing a GES-like database of crash and near-crash events so researchers and the public can more easily query the data.

b. Early Warning Reporting (EWR)

Pursuant to regulations implementing Section 3 of the Transportation Recall Enhancement, Accountability and Documentation (TREAD) Act, motor vehicle manufacturers and motor vehicle equipment manufacturers must submit EWR data, which will be used by NHTSA as a pointer to help identify potential safety-related defects. On a quarterly basis, all manufacturers are required to provide information about all claims and notices they receive that alleges that a death or injury was caused by a defect in the manufacturer's product. In addition, manufacturers of more than 500 vehicles, and all manufacturers of child restraint systems and tires, are required to report aggregate data about warranty claims, property damage claims, consumer complaints, and field reports. The first reporting period was the third quarter of 2003.

c. National Occupant Protection Use Survey (NOPUS)

The NOPUS is implemented annually using a standard survey method and collection procedure to measure occupant protection system usage nationwide. Vehicles in urban, suburban and rural areas are observed on approximately 2,000 road segments, including both small local roads and busy interstates. The purpose is to collect safety belt and child restraint use, as well as demographics of the data users and non-users, to determine who is/is not "buckling up," in which types of vehicles, at what times, and on what types of roads. Annual data from the NOPUS are essential to measure progress in reaching the national goals for safety belt use and the goals specified in the TREAD Act. While the underlying data from the NOPUS are used by NHTSA to inform the public through reports about trends in occupant restraint use, they are not generally accessible to the public because of the complexity of the sampling design.

In summary, federal data challenges include several data gaps and limitations, with a variety of causes. Some gaps exist because no data are collected on that topic. Other gaps occur when the data are collected, but the content is incomplete, the sample size is insufficient, or the data quality is unreliable. When these limitations are combined, the problem is multiplied. For example, statistical significance is difficult to achieve when, although the sample size is sufficient, missing data cause the majority of eligible cases in the sample to be excluded from the analysis. Another example of the data gap problem is when case selection criteria cannot generate statistically significant samples because the universe of available data is too small. Some of the limitations emanate from State data, which is the topic of the next section.

B. State Data Issues

1. Value of Data Collection

Capturing complete documentation of a crash event is often a low priority when traffic safety data are not perceived as relevant to the work of the law enforcement officer or other public safety provider. Under these conditions, data quality is poor, and budget cuts causing staffing strains make the situation worse. Poor data quality decreases the credibility, and thus the value, of the data. However, provided with complete, accurate and timely data, these groups would be able to make more informed decisions about the optimal use of their resources and manpower to enhance the public safety. Therefore, helping them realize the value of their data collection and view this task as a higher priority is an important part of the traffic safety data improvement process.

Failure to adhere to State reporting requirements may limit the capability to evaluate the effectiveness of countermeasures initiated by the State. A property-damage-only crash in which injuries are prevented represents a traffic safety success. However, these types of crashes are often under-reported. As a result, information about the success stories may vary between agencies and within agencies as the workload changes by shift, season, external events, etc.

Undervalued data are likely to be incomplete when insufficient resources are available to ensure complete reporting in compliance with State regulations. Unfortunately, incomplete data generate a skewed picture of safety performance that can lead to a State failing to qualify (or qualifying improperly) for highway safety incentive funding. For example, if a county reports motor vehicle fatalities to the State on a quarterly basis instead of within the mandated 24-hour period, that causes the State's monthly fatality report to FARS to contain missing data. In order for FARS to comply with its own mandates for reporting national fatality results, NHTSA staff must use imputation techniques to estimate the missing data.

2. Missing or Inaccurate Data

Missing or inaccurate data may also be caused by complicated procedures (e.g., procurement processes), which may hamper timely revisions of crash data elements, resulting in an inability to keep up with changing technology or safety recommendations. For example, one result may be that the State's child restraint-use data may not be able to distinguish between belts and child safety or booster seats. Data may also be missing simply because drivers involved in non-injury crashes may leave the scene. Limited space, common to paper-based data collection, may prevent collection of sufficient details (e.g., all of the driver's actions, vs. just a few).

Variations in State reporting thresholds cause national data to be incomplete for comparisons. For example, some collect data only for the drivers, some include drivers and passengers (though sometimes only a limited data set for uninjured passengers), and some collect data only for the drivers and injured passengers. When alternative data sources do exist for some of the missing data, such as EMS times generated by computer-aided dispatch systems, the data may not be integrated into traffic safety data or easily accessed by EMS or FARS analysts. Other reasons for inaccurate data may be unintended consequences of legal penalties for unsafe driving behaviors. For example, these may be perceived as incentives to over-report safety belt use or under-report alcohol use.

Some data may be inaccurate because edit checks are too time consuming and labor intensive to implement in a paper-based data system.

3. Data Timeliness and Accessibility

Paper-intensive data collection and transfer processes do not have the capability to generate data within a time frame that enables a quick evaluation of recent traffic safety initiatives. Processing delays cause most Statewide data files to be unavailable for use until a minimum of three to six months after the calendar year ends. Data collected manually must first be scanned or keypunched, which is done far from the original data collector who is no longer available to interpret handwriting, make sense of inconsistent information, or correct errors. For example, a crash report may pass through 25 sets of hands before data are entered into a computer.

When needed data are not available in a timely manner, data users may be forced to maintain separate data entry systems in order to comply with reporting requirements. (In many police jurisdictions, data capabilities are limited to a map and stick pins to indicate PDO, injury and fatal crashes.) When the agency responsible for the crash data and the law enforcement community at the State and local levels do not work collaboratively, the former may not be aware of all of the potential and actual uses of their data. In those cases, if staff lacks a comprehensive understanding of the importance of the information being collected, they may be unaware that restricting access to their data may in fact diminish the usefulness and credibility of the data they have worked so hard to collect. State and local agencies work hard to meet the rapidly changing expectations of the technical and non-technical data user. Consumers expect faster service, with successful responses resulting in even higher expectations as they discover what the potential uses are for the data. Yet State budgets may overlook committing funds for resources to allow the data to be accessible and user-friendly.

4. Electronic Conversion of Existing Crash Data Systems

Another challenge faced by data collectors at the State and local levels is that the process of converting paper-laden, labor-intensive crash data systems to more streamlined electronic systems may prove difficult. Despite existing data systems failing to keep pace with changing needs, resistance may emerge from memories of previous failures or fear of implementation problems related to choosing new equipment, training staff, maintaining dual systems, obtaining funding, etc. Resistance tends to be exacerbated if it appears that resources are limited. States with large populations and/or several jurisdictions spread out across a large geographic area seem to have more difficulty in implementing new technology, as costs associated with developing and implementing improvements are larger. Attempting to implement new technology is risky in an environment of rapidly changing technological advances coupled with long bureaucratic delays in obtaining approvals. Nevertheless, availability of sufficient resources and commitment at both State and local levels can eventually lead to a successful conversion.

5. Real-time Data Linkage

Few States or other jurisdictions currently have the capacity to link data in “real-time.” However, this ability can be critical in several instances: providing timely and appropriate medical care for injuries (described under Medical Outcome Data, below), facilitating timely citations and adjudication, and improving the accuracy and security of personal identification and licensing

procedures. In the case of citations and adjudication, as opposed to the ability of multiple data users to access electronic data simultaneously, paper-based data are usually only accessible to one person at a time, creating delays for other data users. For example, judges are permitted to keep paper-based data files for deferrals they are adjudicating. As a result, this information is often delayed before being included in the State data files. Judges themselves have difficulty obtaining real-time data from the State data files when the data are not electronic or integrated.

Real-time data can greatly improve security and safety in the area of driver licensing. When driver identification data cannot be validated because of the lack of real-time linkages, drivers can obtain multiple driver licenses in various States by changing the personal identification data given to DMV personnel at the time of application. A particular concern is when anticipation of a license revocation in the home State of record causes a problem driver to cross State lines and obtain a driver license from another State. The duplicate licensure is not flagged; since no licensing system currently exists that identifies all licensed drivers in the United States.

6. Uniformity of State Data

States benefit by being able to compare their results nationally and with one another to identify problems and evaluate progress. Non-uniform data delay timely merging for local, State and national comparisons that could identify traffic safety problems as they emerge.

Traffic safety data elements collected by the States have evolved over time as systems have been developed, revised, and updated with new technology. Despite the absence of federal mandates for uniform definitions and attributes, most States have collected a similar core of information about crashes. With the escalating complexity of traffic safety issues, however, increasingly detailed information is needed to continue progress in preventing crashes, fatalities and injuries. Fortunately, technology has evolved beyond the limits of a paper-based system, thus permitting the collection of more detailed types of data. As a result, a collaborative effort initiated by NHTSA, FMCSA, FHWA and the Governors Highway Safety Association (GHSA) produced the Model Minimum Uniform Crash Criteria (MMUCC), a voluntary guideline for the implementation of uniform crash data elements. Another collaborative effort between NHTSA and the National Association of State EMS Directors (NASEMSD) produced the National EMS Information System (NEMSIS), a voluntary guideline for uniform EMS data elements. Several software vendors have incorporated these uniform data element names, definitions and attributes. However, due to insufficient funding, some States may be forced to delay implementation of the uniform guidelines and/or the new software. As a result, State data continue to be non-uniform nationally.

Challenges to data uniformity also arise when States or local agencies resist implementing uniform data element names, definitions and attributes by citing privacy and security concerns as the justification. However, this may simply be an excuse for an agency's reluctance to share information since States can use the same privacy and security policies that have been developed and implemented to protect privacy in their electronic driver licensing and vehicle registration data systems.

Crash reconstruction data are not uniform, although they are collected by most State highway patrol and major police jurisdictions with teams that investigate and document serious crashes. The data are neither shared between teams nor with NHTSA. Although NHTSA assisted in the training of

crash investigators at the State and local levels, there was no effort made to ensure that the data they collected would be uniform and shared.

7. Exposure Data

While safety programs rely on good crash data, the ability to analyze and use crash data effectively is often dependent on good exposure data, which is much less available. Exposure data serve three main purposes: 1) to normalize crash data, 2) to aid the analysis of risk factors, and 3) to help evaluate safety improvement strategies. Some broad indicators of transportation activity, such as vehicle miles of travel (VMT), are available to help normalize crash data, but these measures are of varying quality and incomplete. For example, there is little data on pedestrian and bicycle exposure, or occupational exposure, to normalize injury rates in these cases. And estimates for person-miles of travel are less reliable than VMT. These shortcomings limit our ability to compare risks across groups or over time. To understand risk factors, even greater resolution is needed, including data on non-incident operations that are comparable to incident data. We know much more about the circumstances of crashes and injuries than we know about the prevalence of those same factors in everyday operations. For example, we know how many drivers age 16-17 are involved in fatal crashes during the hours of 1-3 AM on rural roads, but we do not have good data on the numbers of these drivers on those roads at those times. Such information is critical to fully understanding differences in risk, and therefore to targeting and evaluating interventions.

8. Medical Outcome Data

Law enforcement documents a crash survivor's level of functioning at the scene using KABCO (i.e., Fatal Injury (K), Incapacitating Injury (A), Non-Incapacitating Injury (B), Possible Injury (C), No Injury (O)). A medical indicator of severity requires medical information linked to the crash data. Few areas collect both crash and medical data electronically to enable real-time linkage of crash and EMS data at the scene and with the emergency department data. Again, real-time linkage is important because it can reduce the uncertainty that is characteristic of the retrospective linkage of Statewide crash and medical data. However, before real-time linkage can occur, the crash, EMS and hospital data systems and/or patient health records must be electronic and the data must be uniform and integrated. Even then, retrieval of this information may be complicated by privacy concerns.

In the meantime, 27 States are linking Statewide crash and injury outcome data retrospectively, as part of NHTSA's Crash Outcome Data Evaluation System (CODES) project, to provide a source of State-specific, population-based, person-specific crash outcome data for research purposes. In the absence of unique identifiers such as names (usually not available in Statewide injury data), probabilistic linkage and imputation techniques have been effective for linking the multiple records for a specific person, long after the crash has occurred and the victim discharged. These techniques permit linkage not only to the records completed at the time of the crash, but also to other types of records relevant to the crash such as driver licensing and vehicle registration, as mentioned earlier in this report.

9. Analytic and Information System Capabilities

Given the increasingly technical nature of traffic safety data, it has been difficult for State highway safety staff and regional staff to obtain the most up-to-date technical information needed for evaluating the functioning of traffic safety information systems (TSIS) and determining the best

strategies for improving the data to better support their needs for strategic planning. NHTSA has attempted to provide access to analytical support by contracting with a data expert in each region. This expert provides guidance to the regional offices and the State traffic safety offices (SHSO) as they focus on emerging problems in terms of who, what, when, where and why. Despite this regional resource, however, sparse local and State resources for data analysis often limit the effective use of the traffic safety data being collected.

10. Training Opportunities

Training for data analysis is an important part of building data resource infrastructure within a local or State agency which collects or houses traffic safety data. If they do exist, training resources tend to be limited to initial instruction. Law enforcement staff receives limited training in how to analyze and document crash events at their academies, usually during their initial training or occasionally during periodic refresher training. State law enforcement and the highway patrol usually receive more training than local law enforcement.

Resources are limited for training experts to conduct State traffic safety data assessments. For these assessments, NHTSA convenes a multidisciplinary group of experts to meet with the State's traffic safety data stakeholders. The team uses traffic safety data advisories, developed by NHTSA, to identify current problems, needs and to develop recommendations for action. In many States, the traffic safety data assessment is more than 5 years old. Unfortunately, the current pool of experts is too small to conduct more than 8-10 assessments in any given year.

C. Challenges to Improving Federal And State Data

Attempts to improve traffic safety data in the past have often either failed outright, fallen short of expectations, or were delayed because of existing barriers to the improvement process. In addition to the specific data challenges identified above, there are three overarching areas of challenge to be addressed in order to succeed in improving traffic safety data. These include: (1) organizational philosophies and practices, (2) focus, and (3) resources. The hope is that existing technologies can be dramatically successful once implemented, provided these three areas are addressed.

1. Organizational Philosophies and Practices

At both the federal and the State level, the ability to resolve existing data problems is hindered by certain institutional structures which encourage acting independently and discourage coordination among agencies or departments. TRCCs were developed to encourage inter-agency cooperation to improve traffic safety data and data-related processes, as Section 411 funds under TEA-21 led to the creation (or reinvigoration) of a TRCC in almost every State.[*] However, the level of support for the TRCC varies greatly from State to State, depending on the State's data-related philosophies and practices. The TRCC may have limited influence to inspire change if States have no incentive for improving data. In some States the TRCCs have developed plans for improving their traffic safety data, but these have not been implemented by the State. In a few States the individual agencies or departments housing major safety data files have not formed a TRCC, do not share their system development plans with each other, and focus only on benefits to their specific organizational unit.

[*] To date, forty-eight states, plus the District of Columbia, the Indian Nations, American Samoa, Guam, Mariana Islands, and Puerto Rico qualified for Section 411 funding.

A TRCC may not be able to overcome the lack of collaboration when there is no oversight; a volunteer manager may not be able to provide leadership if he or she is not given sufficient time to do the job or if he or she lacks objective performance measures to track progress.

2. Focus

Traffic safety data are used for many different purposes. States use the traffic safety data for administrative purposes, managing prevention, enforcement consequences of traffic safety events, and safety promotion. Without the administrative responsibilities of a State, the federal government focuses primarily on ensuring that the data are useful for evaluating the status of traffic safety, looking at crash outcomes, developing regulations, and designing national safety programs. Increased requirements by Congress for performance-based programming may increase the focus on data to support State level traffic safety efforts. However, most routinely collected and accessible State traffic safety data have been initially collected and maintained for agency-specific purposes without consideration of the potential for integrating these data. There is now a rising sense of urgency to understand trends and patterns of the increasingly complex traffic safety and vehicle issues. Motor vehicle crashes are more likely to be viewed as a major public health problem, one that can be reduced by actions grounded in careful vehicle and traffic safety data analysis. As a result, there is more focus on the benefits of integration for more effective enforcement and evaluation of injury outcomes.

While advocates for improved traffic safety data are generally located in the agency responsible for the data (e.g., State DOT, DMV, DPS), they must nevertheless collaborate with others to obtain a sufficient level of resources to be successful. The normal bureaucratic processes have been slow to recognize and support the rapid increase in the value and capability of traffic safety data and the role of collaboration in making this happen. The lack of collaboration is not unique to the States, as federal agencies also must make efforts to interconnect and harmonize their traffic safety data.

When a State traffic safety leader has no contact with the governor's office, or there is no common voice from the governor's office, the State legislature, the National Governors' Association, the National Conference of State Legislatures, and so on, then the message that safety saves lives and prevents unnecessary economic loss is overlooked during the fierce competition for funds. State leaders may become discouraged when there is a conflict between national incentives for change and State laws or priorities. Sometimes, it is not possible for them to take action until an out-dated system collapses, no longer able to be maintained.

3. Resources

Attempts to improve traffic safety data have been slowed by federal and State organizational differences in system philosophy and operations, as seen above. Institutional environments that discourage collaboration and do not allow staff to spend time working on these data issues create obstacles to data improvement. As a result, local jurisdictions and statewide efforts to convert to electronic data collection and transfer are being pursued separately, often duplicating efforts when they lack coordination. On the other hand, when States have functional intra-agency coordination, they have been able to make the most effective use of available federal resources. Intra-agency coordination is also a federal challenge, both as it relates to financial resource allocation and other issues pertinent to traffic safety data.

All State and local crash data systems have been developed from general software that is then customized for the traffic safety environment. Although software may be distributed free of charge,[*] the customization process is not free. Some States and local areas have been unable to convert to electronic data collection and transfer because they do not have the funds to customize their software or to do anything with the electronic data after collection. Whether a State chooses to join with others in hopes of sharing the costs of customization or hires a contractor to develop State-specific software depends upon several factors[†], including: size of the State/jurisdiction; flexibility of the software in relation to the complexity of existing data capabilities, and the feasibility of integrating them; whether collision information will only be used to produce public reports; whether it will include statistical analysis capabilities; and where data collection will take place (e.g., at agency, police vehicle, or both). Estimates for adapting commercial software in a State can range from $300,000 to $1.3 million.[‡]

One large State spent $14 million to create new software to convert paper-based data entry to electronic entry. The State will spend another $850,000 to operate the system so that electronic entry can be performed either at the officer's desk or at the State level. No single funding source exists for the State to obtain another $25-26 million dollars needed to equip all law enforcement vehicles in the State (about $1200-$2500 per vehicle unit) so that all data entry could take place at the scene. (This expense does not include the cost to maintain or replace the equipment over time and also may not include mounting equipment, installation/ retrofitting, portable printers, modems/GPS enablers, radio communications, cellular airtime, scanner/barcode readers, FTP software for moving data and cellular airtime.)

4. Implementation of Existing Technologies

In the formation of this report, State and national traffic safety experts provided evidence that giant strides in overcoming the traffic safety data challenges could be made by merely implementing the technologies that already exist and are currently available in the marketplace. The automatic crash notification (ACN) and global positioning systems (GPS) technologies, which can identify crashes as soon as they occur, are becoming increasingly available. In-vehicle EDRs are already in many vehicle makes and models, and will be enhanced to record pre-crash movements, crash speeds and crash severities. Smart cards for driver or vehicle information already exist and can be used in conjunction with the electronic crash data systems to reduce the burden of data collection. The Internet already exists as a powerful mechanism to collect, access and transfer traffic safety data. MMUCC[13] has already been incorporated into software for electronic data collection and transfer systems.

[*] Such as with Iowa's Traffic and Criminal Software (TraCS), for example,

[†] For example, the New England Model refers to the use of software developed by Ledge Light Technologies, Inc., by the New England States. The system architecture was customized for Statewide, rather than local, implementation. Each State's system is State-specific but all share the same Statewide focus. This Statewide approach to electronic data collection and management differs from TraCS, which focuses on local jurisdictions. Another State-specific alternative is a system developed by law enforcement agencies within the State of Kentucky.

[‡] Note: These expenses do not include the cost to maintain or replace the equipment over time and also may not include mounting equipment, installation/ retrofitting, portable printers, modems/GPS enablers, radio communications, cellular airtime, scanner/barcode readers, FTP software for moving data and cellular airtime.

Data collection can become far more efficient and effective by using existing electronic information technologies. In the current environment of rapidly evolving new technologies, the traffic safety community has the opportunity to inspire development of software that helps make traffic safety data more meaningful. For example, sophisticated data collection equipment can improve criminal justice system efficiency. Safety resources can expand when administrative costs are reduced (e.g., by eliminating duplicate data entry) and when available resources can be targeted to the area of highest impact for preventing deaths and reducing injury severity.

Electronic data collection and transfer will generate more reliable and timely State data for data users at the State level and the federal level (e.g., FARS, NASS-GES). NASS-CDS cases will be routinely identified for sampling from the ACN data. Access to this information immediately at the crash scene will support efforts to identify emerging trends earlier. High frequency crash locations can be identified more rapidly, permitting immediate traffic congestion management. Evaluations of effectiveness of impaired driver countermeasures can occur more quickly. Engineers can receive electronic notification of locations needing repair.

Yet, all of these existing technologies require organizational support, focus and resources to ensure successful implementation and maintenance. Therefore, we next turn to key steps required to address these and other challenges to improving traffic safety data.

V. PROPOSED INITIATIVES AND RECOMMENDATIONS

Each of the categories below illustrates the steps needed in order for traffic safety data and related processes to be improved. Clearly there are recommendations which are of little or no cost to either the federal government or the States, just as there are those which will be very expensive, and some in between. For example, some of the coordination, leadership and training-related recommendations have no associated costs or could be paid from existing funds. Conversely, the recommendation to create a National Driver Records identification verification system (see Recommendation section D below) would require significant resources to implement. State TRCCs will use their priority plans and available resources to guide decisions to fund more costly activities. NHTSA and its federal partners will focus primarily on those recommendations that are currently feasible --given current resources -- with the understanding that when budgets and other resources allow, the more costly recommendations can be pursued as appropriate.

Beneath each category will be listed a brief synopsis of its status at both the federal and State levels, followed by proposed initiatives and recommendations (listed in order of priority) at both the federal and State levels. A responsible entity is listed for each recommendation. Each category will describe the general outcome(s) expected to result from the initiatives and the recommendations, if all are enacted. The categories are the following:

A. Coordination and Leadership
B. Data Quality and Availability
C. Electronic Technologies and Methods
D. Uniform and Integrated Data
E. Facilitated Data Use

A. Coordination and Leadership

The recommendations in this section are aimed at strengthening the coordination and leadership needed to improve traffic records. TRCCs will function at the State and federal levels to overcome organizational obstacles and ensure effective use of available resources. The TRCC at the federal level, the U.S.DOT Highway Safety TRCC, must lead by example and demonstrate to the States the benefits of a coordinated approach. The federal and State TRCCs must exert strong leadership to market the importance of the role of better data in improving highway safety, ensure funding for this important task, and emphasize the benefits of using existing technologies.

Current Status:

FEDERAL LEVEL

Currently, no TRCC exists within the U.S.DOT to coordinate resources that could improve traffic safety data and data processes. Other federal stakeholders are likewise unable to join with the U.S.DOT to present a uniform message when advocating for an increase in available resources and priority at the federal level. A Data Integrated Project Team was convened by NHTSA to provide recommendations and priorities for how data should be improved to promote safety and capture the increasing complexity of traffic safety and vehicle issues.

STATE LEVEL

Forty-eight States, plus the District of Columbia, the Indian Nations, American Samoa, Guam, Mariana Islands, and Puerto Rico that qualified for Section 411 funding have convened a TRCC as part of the 411 program. However, few of these TRCCs are empowered to coordinate State traffic safety data resources. (A case study of the Iowa Statewide Traffic Records Advisory Committee is presented as part of Appendix D.) In addition, other stakeholders at the State level do not have access to uniform information that would enable them and the State TRCC to speak with one voice when advocating an increase in the State's priority for improving traffic safety State data.

Proposed Initiatives and Recommendations:

FEDERAL LEVEL

1. **NHTSA will sponsor organization of a U.S.DOT Highway Safety TRCC, including representatives sanctioned by FHWA, FMCSA, and BTS in addition to NHTSA, to provide leadership to minimize duplication of traffic safety data collection efforts and ensure the coordination of resources for such data.** An effective membership of the U.S.DOT Highway Safety TRCC would include persons with both decision-making authority and expertise in traffic safety data and whose tasks related to the TRCC would be included among their regular duties. The U.S.DOT Highway Safety TRCC must lead by example. Coordination of traffic safety data resources must occur at the federal level before coordination can be realistically expected to occur at the State level. A letter of commitment or similar document, signed at the senior management level, should indicate each agency's willingness to improve traffic safety data through a U.S.DOT Highway Safety TRCC that will:

a. **Set policy indicating that data are necessary to run successful traffic safety programs, enforcement programs, and for public health purposes**. Integrate this policy statement into highway safety operations. Support fact-finding missions to obtain information about best practices and available funding sources. On a periodic basis, formally assess national progress on the implementation of electronic data acquisition and transfer, uniform and integrated data, and facilitated data use in the States.

b. **Prepare a plan that indicates how each agency will coordinate its spending plans to improve traffic safety data so that the requirements of one federal agency are harmonized with the requirements of the other federal agencies.** This plan should indicate each agency's available funding levels, the results they expect, a process and sequence for content and timing of accomplishments, and assess whether the coordination process is working. In addition, the plan should indicate other potential federal funding sources. Adequate funding conveys the message that motor vehicle crash injuries are a major public health problem that is taken seriously. The plan should assign a high priority to funding State data systems at the level necessary to generate complete and accurate data for State-specific purposes and to strengthen the interaction between the data collected and the data needed at the federal level for policy, planning, programming, and evaluation.

c. Collaborate with the States by sponsoring an MMUCC-like process, involving all stakeholders, to develop performance guidelines for State TRCCs. These guidelines should define the following characteristics of good traffic safety data: timely, accurate, complete, uniform, integrated and accessible. The States should be allowed flexibility in determining how they will meet the performance guidelines.

d. Support strong State leadership by the governors and State legislatures to improve traffic safety data so that lives can be saved. States are dependent upon the U.S.DOT highway safety agencies to ensure that the governors and State legislatures exert strong leadership to help the State TRCC improve traffic records. State agencies should be assisted in marketing the importance of State traffic safety data at the State and local levels by publicizing States' best practices to demonstrate how improvements in State data benefit all stakeholders, including the general public. The key message to both the public and the legislators should be that accurate data are crucial to decision-making to improve vehicle and traffic safety.

e. Encourage DOT agencies and other federal stakeholders to express a uniform message to increase the importance of traffic safety data at the federal level. Besides the stakeholders at NHTSA, FHWA, FMCSA and BTS, uniform data should be shared with other stakeholders, interested in improving traffic safety data, in U.S.DOT at the Federal Transit Administration and the Federal Railroad Administration, at the US Department of Health and Human Services, the Department of Justice, the National Judicial College, at associations including the Governors Highway Safety Association, National Safety Council, Association of Traffic Safety Information Professionals, International Association of Chiefs of Police, American Association of Motor Vehicle Administrators, Insurance Institute of Highway Safety,

Association for the Advancement of Automotive Medicine, American College of Emergency Physicians, American College of Surgeons, in addition to pre-hospital providers, public interest groups and others.

2. **NHTSA will convene an annual federal data users meeting to provide related updates and training and obtain feedback.** NHTSA needs regular feedback from the federal data users, including those outside of the federal government, about the usefulness and status of the federal databases. Both new and experienced federal data users need information about changes to the data and need training geared to using the data more effectively.

STATE LEVEL

1. **TRCCs should be organized and functioning in each State to build, strengthen, and provide the leadership needed to ensure that State resources for traffic safety data are coordinated.** The State TRCC should include the State's Department of Transportation, the State Highway Safety organization (SHSO) and regional and State data providers and data users, in addition to the owners/managers of the State traffic safety data. An effective membership would include persons with both decision-making authority and expertise in traffic safety data and whose tasks related to the TRCC would be included among their regular duties. Each State TRCC should:

    a. **Develop and implement a multi-year strategic plan that establishes priorities for improving traffic safety data.** The plan should address the State's traffic safety data and processing deficiencies, integrate State data needs and goals with the State's highway safety plan, identify performance-based measures for measuring progress, indicate how funds will be used, and what progress the State has made to date. (Characteristics of a successful State TRCC are listed in Appendix D.) A collaborative approach to developing the plan will be necessary to jointly identify the gaps in existing resources, negotiate the various authorities to perform each task, and assign who should be responsible, in terms of people and agencies, for completing each task. A time-line should be established and a plan of action completed per the uniform performance guidelines to be established, using an MMUCC-like process, for State TRCCs.

    b. **Assess progress regularly.** The State TRCC should assess the status of its traffic records capabilities every 5 to 6 years to determine the status of its traffic safety data capabilities. Key performance measures should be implemented to identify deficiencies. As a minimum, needed improvements, identified during the assessment process, should be given priority for implementation when the traffic safety data strategic plan is updated.

    c. **Implement proven traffic safety technology, methods and software**. State TRCCs should discourage reinventing the wheel, which would only waste resources and time. Instead a high priority should be assigned to using proven technology, methods and software that will enhance uniformity and integration, statewide and nationally. If States use in-house programming staff to develop a State-specific system, the system should comply with national guidelines for uniformity and integration

2. **Each State TRCC and other State stakeholders should express a uniform message about the importance of building and strengthening the leadership, direction and priority to improve traffic safety data at the State level**. The State TRCC should share uniform information with other State stakeholders located at the State Department of Transportation, Highway Safety, Department of Health, EMS agency, and other public and private entities. The State TRCC must provide the leadership necessary to motivate the stakeholders, facilitate understanding, ensure training, provide tools and incentives, and ensure compliance with plan priorities. By strengthening the collaboration within the State and with the U.S.DOT Highway Safety TRCC, the improved State data can be used to facilitate efficient and effective State resource allocation decisions and to strengthen the State's traffic safety data program.

Expected Outcome For COORDINATION AND LEADERSHIP: Costs to local, State and federal government agencies will be reduced by avoiding duplicate data systems and preventing the development of independent, non-uniform traffic safety data that cannot be integrated. Strong leadership at both the federal and State levels will permit all stakeholder agencies to overcome organizational barriers, thus allowing a clearer path to improving traffic safety data.

B. Data Quality and Availability

These recommendations are aimed at improving the quality and completeness of federal data, improving, as resources permit, the quantity and timeliness of federal data, and filling the data gaps in early warning reporting, citation tracking, non-traffic deaths, off roadway traffic deaths and exact location data. Existing initiatives, already funded, are recommended for continuation to fill in some of these gaps. State level traffic safety databases—including the amount and accuracy of data captured – continue to need to be enhanced and the data quality improved in order to meet data users' needs.

Current Status:

FEDERAL LEVEL

NHTSA, in its study of 10 States to determine the causes of missing BAC data at the State level, found that States with a medical examiner/coroner practice of testing all driver fatalities produced high testing rates when the practice was clearly understood and consistently applied. In all cases, good communications, adequate staffing, and resources are important. Coordination, cooperation, and someone taking responsibility are crucial to ensure a high priority for improving the BAC data.

At the request of the States, NHTSA currently sponsors traffic safety data assessments every 5-6 years to help States evaluate the current status of their traffic safety data. Existing data initiatives have focused on meeting data users' needs for more timely data and for more information about emerging issues. Easier access has been enhanced by a computer application enabling entire cases (forms, images, sketches, etc.) from NASS-CDS, NASS-GES and SCI to be viewed free and immediately on the Internet merely by entering the case number. New data elements have been added to NASS/SCI, CIREN to meet data users' needs for more information about child restraints,

advanced occupant protection systems, tires, and tire pressures and to incorporate event data recorder output to support NHTSA rulemaking.

A proposal for an Early Fatality Notification System (EFNS) for FARS was submitted to Congress in NHTSA's fiscal year 2005 Budget submission. "Fast FARS" will use the FARS infrastructure to provide near real-time accounting of traffic fatalities without interrupting the collection of the detailed information found in FARS.

The State and National Fatality and Injury Data web page on NHTSA's website provides State profiles of traffic safety data and information including: crash statistics (for both passenger vehicles and large trucks), economic costs, legislative status of driving with .08 BAC and primary vs. secondary safety belt laws, and funding programs.

EWR data were initially reported to NHTSA for the third quarter of 2003. Manufacturers must report deaths and injuries and aggregate data that will assist NHTSA in promptly identifying potential safety-related defects in motor vehicles or items of motor vehicle equipment.

NHTSA's CODES Project uses probabilistic linkage and imputation techniques to integrate different types of crash and injury data so that crash outcome information can be obtained without the expense and delay of new data collection. Twenty-one of the 30 CODES States with at least two years of linked data participate in the CODES Data Network that facilitates access to the State-specific linked data by NHTSA analysts.

NHTSA's National Center for Statistics and Analysis (NCSA) has recently expanded its State Data Program. Each year, the participating States submit their State crash data to the State Data System (SDS). The public can also gain access to these SAS files upon request to the States. In the last year, the SDS has grown from 17 to 29 participating States and NCSA is working with many other States to further expand participation.

In a separate effort, BTS is working with a small number of states to collect test data toward developing standardized files of traffic crash, vehicle registration, driver licensing, and driver history data. The goal of this pilot is to evaluate the feasibility of transforming the files into a common format without losing important information or misrepresenting the original data. Five states have provided data for the pilot test, and BTS is beginning evaluation of the data.

STATE LEVEL

Demonstration States, funded by NHTSA, are testing the feasibility of integrating data about impaired drivers. These States are improving their data capabilities so that citations can be tracked from the time of issuance through the adjudication process. The experiences of these States will be used to develop guidelines for implementing tracking systems for impaired drivers. But they also will demonstrate the feasibility of real-time linkage, with the implementation of electronic collection and transfer of uniform, integrated data for tracking traffic safety events and improving traffic safety.

In addition, technology exists for cities and local jurisdictions to implement GPS/GIS. In Minnesota, the twin cities of Minneapolis and St. Paul have developed 170-200 different data layers. NHTSA uses latitude/longitude to add specific location information to each FARS case. GPS technology is used in many areas throughout the country for dispatch of law enforcement, fire and

EMS and many police jurisdictions also have the capability to access a GIS map to electronically document where the crash is located. Some vehicles include a system that provides access to latitude/longitude information.

Proposed Initiatives and Recommendations:

FEDERAL LEVEL

1. **NHTSA will provide technical assistance to States to improve the collection and reporting of BAC and drug information.** Timely and complete reporting of BAC and drug information at the State level is necessary for State specific purposes and for FARS. NHTSA continues to fund testing demonstration projects and research studies to determine the most effective methods for collecting and reporting better BAC and drug data at the State level. Accurate State and national data are critical to measure the size of the impaired driving problem, describe its characteristics, evaluate trends, explore potential countermeasures, and evaluate the effects of laws and programs.

2. **If "Fast FARS" gets approved and funded, NHTSA will design and implement Fast FARS to obtain State fatality data with a lag-time of thirty days for all fatalities and within one week after national holidays.** NHTSA and the traffic safety data community have a need for "real-time", or "near real-time", information on fatalities resulting from motor vehicle traffic crashes. These data will also provide timely information to the Congress, to report on progress toward meeting agency and departmental goals, and to inform the public about the State's traffic safety. Both FARS and NASS provide a detailed, annual accounting of characteristics of motor vehicle crashes. However, relying on data collected weeks or months after the crash is inferior to obtaining even "near real-time" data. States would be asked initially to submit crash fatality data with a lag-time of thirty days for all fatalities, and within one week after national holidays. Later these time frames would be tightened to two weeks for overall information and to 24 hours after the end of the holiday period.

    a. **NHTSA will develop protocols, procedures, processes and data management systems for "Fast FARS" to facilitate:**
        - Evaluation, improvement, and continuous monitoring of the State fatality notification programs, including the identification of under-reporting;
        - An electronic reporting system for FARS State personnel to record the data and for these data to be collected into the national system; and
        - Statistical procedures for adjustments to notification data and for publication of data and information.

3. **NHTSA will develop and implement a National Motor Vehicle Crash Causation Survey (NMVCCS).** NHTSA will perform a nationally representative survey of crashes for a general-purpose database to support current and future research on the events and factors related to the causes of crashes. Using the NASS-CDS and the Large Truck Crash Causation Study as models, the survey will collect a sample that is sufficient to study all types of vehicles, interactions between the vehicle and the occupants, and interactions between the vehicle and the environment. Routine and continuous data collection will be enhanced with

on-scene data collected from real-time observations and interviews to guide the design, development and evaluation of new crash avoidance technologies as they emerge. The information collected will identify special studies that are needed to determine new strategies for crash avoidance.

4. **NHTSA will consider increasing the annual NASS-CDS sample from the current 27 Primary Sampling Units (PSUs) and 4800 cases, as resources permit.** The original sample to be generated annually by NASS-CDS was designed to evaluate crashworthiness issues in a timely manner. Over time, the sample has been reduced so that it currently has little chance of meeting the original objectives. Increasing the number of geographic locations is necessary to increase the resolution of the sample size so that lives are not lost waiting for sufficient data to be generated before a problem can be identified. More cases are also needed to enhance the sample to better support research and vehicle rulemaking functions.

5. **NHTSA, FMCSA and the States will collaborate to develop guidelines for statewide tracking of citation data.** National, uniform guidelines will be developed collaboratively by NHTSA, FMCSA and the States to track all citations from the time of issue, through adjudication and assignment of penalties or outcome and including provisions for tracking court-ordered deferrals or supervisions. The guidelines should include the findings of the States funded by NHTSA to connect their independent systems and determine the feasibility of implementing a model impaired driver records information system. The guidelines should incorporate the functions of FMCSA's commercial driver licensing information system, including a scoring system for commercial drivers. The U.S. Department of Homeland Security and the FBI should be consulted to ensure inclusion of all drivers and vehicles involved in the transport of hazardous materials.

6. **NHTSA will assess the usefulness of the Early Warning Reporting data alerts to assist NHTSA in identifying safety-related defects earlier**. Earlier detection of defects has the potential to save lives. NHTSA will assess the usefulness of aggregated EWR data, in conjunction with other existing data, to justify whether to open a defect investigation.

7. **NHTSA will begin accessing death certificates for special studies of non-crash motor vehicle-related fatalities on a periodic basis to be determined.** NHTSA should use special studies as a more efficient and cost effective strategy to generate data about non-crash motor vehicle-related deaths, which do not occur frequently on an annual basis. Alternative data sources, such as death certificates, are available for many years and so could be used to select more cases than would be available annually, and as many as necessary to obtain a significant sample. Detailed review of a large number of cases would be more effective in identifying vehicle design problems that are significantly related to non-crash motor vehicle-related deaths.

8. **NHTSA will assess changing the FARS protocol to collect information about deaths resulting from crash-involved vehicles that are off the roadway**. This change in the FARS protocol is necessary to support rulemaking to address, for example, such problems as fuel tank fires or pedestrian crashes involving vehicles that are off the roadway.

9. **NHTSA will expand its State Data System (SDS) to include all 50 States and its Crash Outcomes Data Evaluation System (CODES) data network to include all CODES States to increase the usefulness of these data for the NHTSA analysts, as resources permit.** The SDS and the CODES Data Network provide NHTSA analysts with a wealth of population-based crash and related medical outcome information. To expand the SDS, NHTSA must first negotiate the terms for release by the State. This process includes discouraging States from censoring important data elements, particularly the vehicle identification number (VIN) which is needed to make the most effective use of these data for vehicle-related analyses. NHTSA also creates SAS files upon receipt of the State data for direct access on the LAN. Public access to the State data is granted only after permission is obtained from the State owning the data. Electronic data collection and transfer enable NHTSA to quickly prepare these data at lower cost. Each CODES State maintains control of its linked crash outcome data. The CODES Data Network facilitates access by the NHTSA analysts to these data, which must be sanitized in compliance with State privacy regulations.

10. **BTS and NHTSA will work together to improve the collection of data describing exposure to risk for highway safety**.

11. **BTS and NHTSA's National Center for Statistics and Analysis (NCSA) will work together to evaluate the usefulness of the State data pilot for possible incorporation into NCSA's State Data Program**.

STATE LEVEL

1. **State TRCCs should encourage compliance by law enforcement with State regulations for obtaining BAC and drug use information**. Using findings from the NHTSA-funded testing studies described above, States should improve their processes for obtaining BAC and drug use information that is timely. Compliance with State requirements enables federal reporting requirements for FARS to be met on time, thus, eliminating the need for NHTSA to use imputation techniques to compensate for missing data.

2. **States should strive to capture exact location of a crash (latitude and longitude (e.g., GPS)) in their traffic records systems**. Law enforcement could use this technique at the scene of the crash to ensure uniform reporting of location, eliminating the need for staff to enter this information later. For crashes, a guideline should be developed indicating the location and level of precision for measuring latitude and longitude (e.g., first harmful event vs. most harmful event, which part of the bridge, 5 feet or 50 feet, etc.) The uniform latitude/longitude locations should facilitate linking across State lines. All GIS should include local roads whenever possible, so that deaths and injuries occurring there can be highlighted. In addition, NHTSA should collaborate with FHWA to ensure that roadway characteristics, such as design, hardware, etc., also are collected for all roads.

Expected Outcome for DATA QUALITY AND AVAILABILITY: Current data initiatives will be continued and enhanced to meet data users' data needs. Better quality and availability of data will allow federal, State and other stakeholders to use timely, accurate data to make prudent traffic safety policy and resource allocation decisions, particularly in the areas of law enforcement

(including impaired driving), crash prevention (including defects investigations and roadway improvements) and prevention of non-crash motor vehicle injuries and fatalities.

C. Electronic Technologies and Methods

These recommendations are aimed at encouraging States to move from paper-laden, labor-intensive traffic records processes to electronic capture and processing. States are also encouraged to recognize and take advantage of electronic data to advance real-time decision-making, reduce the burden of data collection, improve data quality, facilitate transfer, merging and sharing, and make data available sooner.

Current Status:

FEDERAL LEVEL

NHTSA, FHWA, and FMCSA have partially funded the development of Iowa's Traffic and Criminal Software (TraCS) in exchange for free distribution of the software to States to encourage uniformity. Information about TraCS and other State and local traffic safety data systems is available via the Internet at **http://www.nhtsa.dot.gov/people/perform/trafrecords/pages/tr_systems.htm**. Currently the website includes an online database that is updated continuously with an annual request. Contact information, database size, years of data included, how complete they are, access policies, hardware and software platforms, etc., are described for each system. Information also is provided about the following safety system components: State Safety Data Coordinator, Governor's Highway Safety Office, TRCC, Crash Data System, Crash Statistics Office, Truck/Commercial Vehicle System, FARS, Citation / Conviction System, Roadway Data System, EMS Run System, Injury Surveillance System, State GIS System, Driver License System, Vehicle Registration System. Printable versions of State crash forms, as well as data dictionaries, office coding manuals, availability of data collection software, etc., are included and links are provided to State-maintained crash facts sites. The forms contained at the site include both official State forms as well as forms used by local agencies.

New technologies and methods have been implemented to make the federal data timely and more complete for the user. NASS, SCI, and CIREN were converted from paper-based to a common, paperless, Oracle relational database platform in 1997. This system captures multiple types of data, sketches, and photographs. Sketches can include vehicle damage, scene diagrams and the injury manikin. All intrusion information can now be captured. NASS cases can be made available on CDs to help data users without Internet access or the ability to travel to the storage contractor. XML formats are being developed so that data users can download more NASS data, faster and cheaper, from the website to their computer, regardless of format.

On a separate platform, a FARS electronic data transfer system has been designed to transfer electronic crash data, collected using TraCS, to FARS. This is the first model for digital data collection procedures specifically implemented to improve timeliness between the States and the federal data programs. A web-based training program was developed to train FARS analysts. A similar format is being used to provide training about the use of the MMUCC data element definitions and attributes.

STATE LEVEL

More than half of the States have converted (or are in the process of doing so) to electronic data collection. Of this total, eighteen (72%) States are using the TraCS software. These 18 States have formed a TraCS user group to share technology and resolve problems. Four other States have implemented the New England model that begins with a statewide approach and phased implementation. Kentucky has developed its own State specific system. Many of the States are still at the initial stages of implementation; a recent review of police jurisdictions reporting to NASS indicated that at least two-thirds have no electronic data collection capabilities.

Proposed Initiatives and Recommendations:

FEDERAL LEVEL

1. **The U.S.DOT Highway Safety TRCC will work with States to adopt and/or adapt existing electronic data collection so that the transfer of data, from collection through precincts and headquarters, to the State, is quick and accurate.** The U.S.DOT Highway Safety TRCC will continue to support use of PDAs and other equipment that facilitate electronic data collection and transfer to improve State data and reduce the burden of providing data (particularly for law enforcement) during the traffic safety event. They enable local agencies to comply with State reporting requirements more easily. Whether through Internet transmission or direct download, electronic data are transmitted more efficiently, and timely, to the State's central database, and, ultimately to the user. As a result, the data collector's job is easier and many of the subjective aspects of data collection are reduced.

2. **The U.S.DOT Highway Safety TRCC will maintain an inventory/clearinghouse of State traffic safety data technology**. Crash statistics, economic costs, legislation status, funding programs, et al., have been aggregated at NHTSA's State Traffic Safety Information web page to provide data users access to State profiles of traffic safety data and information. NHTSA will expand its existing inventory/clearinghouse to include citation forms as well as information about national safety data projects sponsored by U.S.DOT, Department of Justice (DOJ), Centers for Disease Control and Prevention (CDC) and others. NHTSA plans to validate and update the inventory on an on-going basis, with input from the States.

3. **The U.S.DOT Highway Safety TRCC will continue to develop data transmission capabilities using XML* formatting techniques**. Different data formats and structures located on different hardware using different software systems make it difficult to share data, thus justifying duplicate data collection Applications using the XML standard facilitate use of the data "as is" and eliminate the need for duplication. With XML, different applications can communicate easily in a language which everyone involved can understand. Developing

***** "XML is a markup language for documents containing structured information. Structured information contains both content (words, pictures, etc.) and some indication of what role that content plays (for example, content in a section heading has a different meaning from content in a footnote, which means something different than content in a figure caption or content in a database table, etc.)…Markup language is a mechanism to identify structures in a document. The XML specification defines a standard way to add markup to documents." In Walsh, N. A Technical Introduction to XML, October 3, 1998 at the website: http://www.xml.com/

a web service based on XML for extraction and searching of common queries will enable data users of federal data to download to their computer, cheaper and faster, complete federal data regardless of any existing variations in formats. For example, use of XML will enable data generated by CIREN, Children's Hospital of Philadelphia (CHOP)* and other diverse sources to be integrated.

4. **NHTSA will explore developing one point of access to query all NHTSA databases and making plain language queries available to refine case selection**. Traffic safety stakeholders who want to use federal data located in multiple systems need a simplified means of access to efficiently obtain the information they need in a timely manner. Developing a single point of access is the next step to process user-defined search criteria, select the appropriate databases, perform the search accordingly, and display the information for the user to download or follow-up with a refined or new data request. For example, with one data request, a user could search on rollover crashes among vehicle types and retrieve nationally representative data from NASS-GES, detailed investigation data, including sketches and photographs, from SCI or NASS-CDS, fatality data from FARS, and injury data from CIREN. The system could automatically create a personalized page to retrieve the data.

STATE LEVEL

1. **States should implement automatic edits at the time data are collected electronically**. States have a large stake in improving data quality, so local and State data collectors should understand the importance of collecting timely, accurate, complete, uniform, integrated and accessible data. Electronic data collection will enable automatic editing at the scene. It is also recommended that supervisors inspect and periodically review the data for consistency.

2. **States should implement data systems that ensure real-time access for real-time decisions related to the traffic safety event (e.g., crash, traffic stop, licensing, registration, citation/adjudication).** Transfer of the electronic data, automatically edited, on a real-time basis during the event provides local and State-level decision makers with current information to justify, for example, revoking a license at the scene of a crash or at the time of licensure. Currently few jurisdictions have the capability to access or update driver licensing or vehicle registration data from the scene of a traffic event, and even fewer can transfer scene information about the crash type, speed, etc., to the emergency department physician to facilitate diagnosis of the injury and decisions about appropriate medical treatment. Furthermore, implementation of a real-time process that permanently links the crash data to the victim's health data for later retrieval and routine merging statewide is very rare. Retrieval of this information, complicated by privacy concerns, is not usually feasible since most patient health records are not electronic. However, integration would support effective enforcement and prevention activities at the State level. At the national level, integrated data generate the information necessary to understand shortly after the crash,

* CHOP has partnered with the University of Pennsylvania and State Farm to form Partners for Child Passenger Safety (PCPS). The PCPS is conducting a surveillance study of children in crashes to determine how and why children are injured or killed. In 3 years, the study has collected information on nearly 150,000 crashes involving over 220,000 children. Information is forwarded electronically from State Farm headquarters to the CHOP research team. Cases are manually selected for on-site crash investigations and automatically selected for detailed telephone interviews. Detailed crash investigations provide the research team with information to form hypotheses about injury mechanisms in crashes. In-depth telephone interviews give researchers a comprehensive view of the range of crash and injury severity.

rather than later, which crashes are causing which injuries, and their significance, so that the effectiveness of countermeasures could be determined sooner, before additional injuries and deaths occur.

3. **States should ensure that their data systems' reporting functions support strategic safety planning (road hot spots, police deployment, BAC interventions, etc.)** Data for reporting systems developed to monitor or support road hot spots, police deployment, BAC interventions, etc. should be converted to electronic data collection at the scene to ensure that the data are timely, accurate and complete for immediate transfer to the data users. These data elements should be compatible with MMUCC for integration with other traffic records.

Expected Outcome of ELECTRONIC TECHNOLOGIES AND METHODS: The implementation of electronic data entry, file merging, transfer and downloading will enable traffic safety data to be more timely, accurate, complete, uniform, integrated and accessible. Rapid transfer of real-time data about a crash to emergency care providers will ensure they provide timely and appropriate treatment to survivors of crashes. Law enforcement and national security will enjoy improved criminal interdiction and local counterterrorism efforts as their data, upon stopping a vehicle, are enhanced by real-time nation-wide license and registration checking. Other advantages include enhanced coordination between States, reduced burden of data collection, and easier implementation of quality assurance programs for routine audits to monitor the validity and reliability of the data. Automatic edits at the time of collection prevent missing data and errors common to manual data collection, thus reducing the need to delay data transfer to other data users. Though all data may not be immediately available at the scene (e.g., BAC level), a system can include an automatic updating process.

D. Uniform and Integrated Data

These recommendations are aimed at encouraging more uniformity in the data elements, e.g. MMUCC data element names, definitions and attributes at the State level and uniform EDR data are the federal level. In addition, linkage of State data systems is encouraged to improve and expand their usefulness.

Current Status:

FEDERAL LEVEL

A collaborative partnership involving NHTSA, FHWA, FMCSA, GHSA, and other public and private organizations developed the MMUCC guideline for uniform data element names, definitions and attributes in 1998. It was updated in 2003 after consideration of the compatibility of the data elements in NHTSA's databases and other feedback obtained from public and private stakeholders.

Uniform data enable the National Law Enforcement Telecommunications System (NLETS) to inform law enforcement at the scene whether a vehicle is stolen and enable New York law enforcement at the scene to verify the validity of a driver license.

Harmonization of traffic records data between the US and other countries greatly improves the ability of different countries to work from a similar data foundation when sharing research findings, developing harmonized vehicle standards, evaluating the effectiveness of traffic control programs and road design innovations, and so forth. While U.S. data systems are generally recognized as among the best worldwide, with many countries interested in developing similar systems, we also need to look at ways of changing coding practices and data definitions to better harmonize U.S. data.

NHTSA has participated in meetings of the Organization for Economic Cooperation and Development (OECD); these meetings are designed to facilitate sharing of information among the member states. NHTSA has hosted representatives from India, France, Korea, Japan, Sweden, among others, who were interested in NHTSA's traffic safety data collection and analysis systems. NHTSA's databases are accessed by international data users on a regular basis. The agency is also working with the State Department on collection of injury and fatality data on Americans involved in motor vehicle crashes outside the U.S.

STATE LEVEL

Implementation of uniform crash data has been facilitated by the inclusion of MMUCC in most electronic data collection and transfer data systems. Currently less than 10% of States have limited crash reporting to include only tow-away crashes, those with property damage of more than $1,000 or crashes involving an injury.

States recognize the value of sharing State-level safety data with local jurisdictions, both local highway entities and enforcement organizations. For example, Iowa has set up a State traffic safety data service at the Center for Transportation Research and Education (CETRE) to provide information to all data users. CETRE and the Iowa DOT have developed the Access Accident Location Analysis Software (ALAS) and GIS ALAS (an ArcView version) location tools for linking data. Ten years of crash and highway inventory data are available to Iowa DOT and CETRE; and, 10 years of crash data are available on CDs or over the Internet to local law enforcement and engineers for each county covering all roads in the State. Iowa DOT plans to make the roadway inventory data available to local police jurisdictions. Over 250 local police jurisdictions are using GIS in conjunction with the TraCS software. IDOT provides free training on the use of these analysis tools to local and State law enforcement and engineers.

Proposed Initiatives and Recommendations:

FEDERAL LEVEL

1. **The U.S.DOT Highway Safety TRCC will promote implementation of uniform data element names, definitions, attributes and reporting thresholds at the State level.** More uniformity, as generated by a MMUCC-like process involving feedback from the data providers and users, is necessary to ensure uniform data element definitions and values that make the data easier and more efficient to merge, transfer and use analytically. This conversion has been facilitated by the inclusion of the MMUCC data element names, definitions and attributes in commercial software for documenting crashes and citations and enhanced by the addition of data elements to document emerging issues (e.g. distracted driver, cell phone use). Uniform State traffic safety data reporting thresholds (e.g.,

MMUCC) are necessary to generate a uniform mix of crashes to meet the needs of local, State, and national users of the State data. NHTSA will obtain feedback about the voluntary compliance of implementing MMUCC for consideration when MMUCC is revised in 2008.

a. The U.S.DOT Highway Safety TRCC will work with all stakeholders involved in the MMUCC-like process to develop performance guidelines for State TRCCs to promote the implementation of MMUCC, aimed at ensuring data uniformity statewide and nationally and discouraging allocation of resources that support non-uniform names, definitions and attributes.

b. **NHTSA will ensure that the data elements in its databases are uniform**. Although NHTSA's databases include different levels of detail, efforts are underway to ensure that the names, definitions, and attributes will be uniform where possible, or at least, compatible. NHTSA will reconvene the MMUCC compatibility data group to monitor the compatibility status of its databases, develop guidelines as needed, and provide oversight. The agency will publicize the process for making adjustments, and will also collaborate with FHWA to ensure the implementation of uniform roadway data elements for crash records.

c. **NHTSA will develop uniform local and State crash reconstruction data and create a crash reconstruction database, as its resources permit**. NHTSA will work with FHWA, FMCSA, the States and training institutes (e.g., Northwestern University) to develop, with the assistance of feedback from the data providers and users, a uniform set of data elements and attributes similar to NASS-CDS for use at the local and State levels for collecting crash reconstruction data. NHTSA will then develop an electronic data entry program based on these elements and the data available to States and law enforcement jurisdictions. As part of this process, training for crash reconstructionists should be expanded to include how to access and interpret the data from the event data recorders and to strengthen the investigations for evaluating causation issues related to the human, vehicle, and environment.

2. **NHTSA will ensure efficient collection and transfer of uniform EDR data.** In June 2004, NHTSA proposed standard requirements for EDRs that manufacturers choose to install in light vehicles. While the proposed rule would not require the installation of EDRs, it would require that the EDRs voluntarily installed in light vehicles record a minimum set of specified data elements useful for crash investigations; specify requirements for EDR data; require that EDRs function during and after front, side and rear crash tests, to increase the survivability of the EDR data; require vehicle manufacturers to make publicly available information that would enable crash investigators to retrieve data from the EDR; and require vehicle manufacturers to include a brief, standardized statement in the owner's manual indicating that the vehicle is equipped with an EDR and describing the purposes of EDRs. Following consideration of public comments, NHTSA will work to finalize this rule.

3. **NHTSA will continue to sponsor a MMUCC website to routinely obtain feedback about the implementation status of MMUCC**. NHTSA will continue to develop the MMUCC website for States to comment about and determine the acceptance level for each MMUCC data element name, definition and attribute. In addition, new data elements can be proposed

and discussed. Although this information will not be incorporated into MMUCC until it is revised in 2008, in the meantime States can use it when developing or updating their data systems.

4. **NHTSA will ensure coordination with international efforts to improve traffic safety data.** NHTSA should continue to collaborate with international partners to improve global traffic safety data by supporting progress in harmonizing international safety standards. This involves changing coding practices and data definitions to better harmonize data with these global partners. In addition, NHTSA should continue to obtain feedback from international data users and facilitate their access to NHTSA's databases.

5. **The U.S.DOT Highway Safety TRCC should implement a National Driver Record identification verification system, as resources permit.** Consideration should be given to combining NHTSA's NDR's Problem Driver Pointer System (PDPS) and FMCSA's Commercial Driver Licensing Information System (CDLIS) into an all driver pointer system that would include identification information and the State of record for all 210 million commercial drivers and licensed drivers of privately owned vehicles in the United States. Personnel from the department of motor vehicles would be able to use the system to determine whether an applicant is currently licensed to drive in another State. The system as envisioned would also allow States to exchange digital photographs for identification verification purposes.

STATE LEVEL

1. **States should implement uniform data element names, definitions and attributes (e.g., MMUCC) and uniform reporting thresholds (as discussed in the MMUCC guidelines), which enable data to be merged for local, State and national comparisons.** Uniformity saves time and money as software developers focus on only one core data set, data collection differences that affect analytical results are reduced, and States have more opportunities to share technology. Different State reporting thresholds may skew analytical results nationally. For example, collecting only tow away crashes under reports the traffic safety "success" stories, decreases the proportion of urban crashes and, as expected, causes the proportions of different types of crashes to be more representative of tow-away crashes rather than for all types of crashes in general. In some instances, local jurisdictions may be forced to maintain a duplicate data system to obtain sufficient data about the types of crashes characteristic of that service area. When only injured persons are included, the lack of information about the uninjured makes it difficult to determine if the data or the safety countermeasures (safety belts, helmets, etc.) are the cause of a downward shift in injury severity.

2. **States should integrate data and expand their data linkage opportunities to track traffic safety events between data files**. Integrated data enable driver license and vehicle registration history files to be updated with current violations; timely updates prevent the wrong driver from being licensed or an unsafe vehicle from being registered. Integration ensures that all reports of supervisions for a driver are available at the time of the driver's

sentencing.[*] Data linkage is an efficient strategy for expanding the data available, while avoiding the expense and delay of new data collection. State TRCCs should develop working relationships with the health care community to ensure that the causation, crash, emergency medical services, hospital and other injury-related data linked during the event are merged statewide, and also linked to other data such as vehicle insurance, death certificates, medical examiner reports, etc., to support State-specific public health needs. Linkage with roadway inventory databases and traffic volume databases at the State level can help identify the kinds of roadway features that experience problems based on the physical characteristics of the roadway, allowing States to better address these needs through their various maintenance and capital programs.

Expected Outcome of UNIFORM AND INTEGRATED DATA: Uniformity reduces processing costs resulting from more efficient merging and integrating of datasets. Integration allows for more effective surveillance, event-tracking, and data analysis. (See also Expected Outcome of Electronic Technologies and Methods.)

E. Facilitated Data Use

These recommendations are aimed at facilitating data access and use. In addition they emphasize the importance of training courses and tools so that people can use the data more easily and effectively.

Current Status:

FEDERAL LEVEL

NHTSA is developing basic and advanced courses on how to analyze the data for various user groups, including law enforcement and physicians. NHTSA is also developing Internet based training courses, targeted to traffic safety professionals, about the major data components of a traffic safety information system.

The Internet has facilitated data use. Instead of obtaining hardcopies of cases from storage for a fee, NASS cases can be viewed on the Internet by national and international users free of charge. Users can run filters on user-defined variables (e.g., injury, vehicle type, vehicle damage) without the assistance of a third party. Since 2001, NASS cases have been released to the NHTSA website when they are complete so that data users no longer have to wait years for the data to be available.

FARS developed and implemented a mapping tool to identify crash locations, valuable key data for GIS linking, and graphical map reporting. A public web tool prototype was tested in 2002 for accessing a combined FARS and NASS-GES database. The FARS Encyclopedia website provides

[*] For example, the State of Illinois took action after a train-truck collision at a grade crossing. The truck driver was discovered to have had supervisions from various courts in northern Illinois for offenses committed while operating a personal vehicle. However, he was permitted to drive if remedial driving programs and other court-imposed requirements were met. As a result of this investigation, the Illinois legislature required information about all supervisions to be sent to the Secretary of State's office so they would be available at the time of subsequent sentencing.

the user with ready access to FARS data, information, and reports. This website provides the user with a query capability that creates unlimited user-defined statistical summaries.

STATE LEVEL

Iowa and several other States are using American National Standards Institute (ANSI) D-16 workshops to help address the problems of usability and training. Several States (MO, NC, IA ME, etc.) have developed statewide training programs about the proper completion of crash reports. The Iowa DOT uses the TraCS training to help law enforcement understand the importance of providing accurate and complete data to IDOT.

Proposed Initiatives and Recommendations:

FEDERAL LEVEL

1. **U.S.DOT Highway Safety TRCC will develop and sponsor-training courses on the operation, performance, and expertise needed for traffic safety data.** NHTSA will develop and sponsor a basic course for the State Highway Safety offices, the NHTSA Regional offices and the FHWA Division offices regarding what comprises traffic safety data, how they operate, how to assess their performance, and providing resources for expert advice on improving such data. NHTSA will also develop and sponsor a course for State and federal staff on problem identification and data analysis. This training will develop analytic capability and applications for understanding the analytical results. As a result of this training, the State Highway Safety offices will be better equipped to hire professional analysts or contract with universities or other vendors when analytical services are required. A third course, for law enforcement, may be developed to provide training on why traffic safety data are important and how to use this type of data to analyze State and local problems and programs.

    a. **The U.S.DOT Highway Safety TRCC will develop and conduct a training needs assessment for all types of traffic safety data stakeholders at the local, State and national levels**.

    b. **The U.S.DOT Highway Safety TRCC will continue to maintain an inventory of available training resources, updating and publishing a list of the currently available U.S.DOT courses on data analysis and traffic safety data.** Resources at the Transportation Safety Institute and the National Highway Institute could be used to develop new courses where needed.

2. **NHTSA will continue to increase online capabilities for access to its databases, as resources permit**. Online access to the data leads to increased demand for the data because the easier it is to access data the more likely agencies and individuals will become dependent upon them. "User friendly" query and analytic tools are important for data users to perform simple queries and analyses, or to access standard reports (e.g., FARS Encyclopedia) that address frequently asked questions. This is particularly true for federal data, which are often accessed by international as well as national data users.

3. **NHTSA will seek to streamline and standardize data access and release policies**. Currently, NHTSA negotiates a separate agreement for each State and each federal database. Thus States that participate in the State Data System, FARS, NASS, CIREN, CODES Data Network, etc., must negotiate a separate agreement to participate in each. Multiple data releases represent a huge expenditure of staff time and involve a lot of duplication because usually the same State data, and frequently the same personnel, are involved in each. NHTSA, in collaboration with its data partners, should standardize its data access and release policies to make the process more efficient and less labor-intensive for both the data providers and the data users.

4. **The U.S.DOT Highway Safety TRCC, along with the State TRCCs, should promote use of traffic safety data for public health and safety purposes**. The U.S.DOT Highway Safety TRCC should ensure that training is available for State TRCCs and highway safety offices to assist public health entities in using the data to develop effective public policy. The TRCCs should support overcoming privacy and confidentiality issues at the State level that lead to unintended restricted access. Although these issues are legitimate concerns for data users, the TRCCs should take a leadership role in ensuring that State legislation/administrative policies are clarified to support access to protected health information for traffic safety outcome studies.

STATE LEVEL

1. **States should implement online access to State data.** Online access provides the opportunity for law enforcement to use traffic safety data more effectively. Links from the crash scene to the driver licensing and vehicle registration history data generate the information necessary to justify immediate license revocation at the scene. This capability allows law enforcement personnel to become more effective, appreciate the value of data and thus the importance of accurate data collection. Online access to the State traffic safety data enables all stakeholders to obtain the data they need without the delay and expense of having to work through a third party. Local law enforcement departments could develop their own databases or download files from the State to their desktop computers to conduct analyses. The State agency that maintains the data should consider making expert analytical services available, perhaps by using NHTSA resources (see above), to answer questions requiring more sophisticated analyses.

2. **States should provide training to data providers on proper data collection procedures and to data users on how to use the data effectively.** Additional training for State and local law enforcement on completing crash report forms and how to use the data they generate should be provided statewide to ensure complete, accurate and timely data. Data collectors who are also informed data users collect better quality data. Technical assistance should provide information on plug and play analytical tools and access to a network of technical experts for States. A guideline could be prepared and made available, indicating the hardware and software requirements for traffic safety data.

Expected Outcome of FACILITATED DATA USE: More people will have access to more user-friendly traffic safety data, and with increased training will have more ability to use it in more

productive ways. Stakeholder data users at all levels will come to rely on the data for more strategic decision-making, planning and resource allocation. As the use of the data increases, the demand for data will also increase over time as data users discover new applications and innovative linkages, leading to an increase in the usefulness of the data.

VI. CONCLUSION

These federal initiatives to improve traffic safety data, along with implementation of the federal and State recommendations, will benefit not only the traffic safety and public health communities, but also the American general public. Both the federal and State-level recommendations provide practical steps, in order of priority, toward achieving the Vision for electronic traffic safety data collection. This direction leads to a reduction in duplicate data systems and independent, non-uniform traffic safety data that cannot be integrated, thus facilitating the efficient collection of good data, and resulting in reduced costs and improved resource allocation decision-making. In particular, strong leadership fosters collaboration and minimizes unnecessary expenses resulting from inefficient approaches to collecting traffic safety data and allocating data-related resources. At the national level, current NHTSA and DOT data initiatives will be continued and enhanced to meet data users' data needs. Progress toward the Vision of improving traffic safety data and data processes will create data that are increasingly timely, accurate, complete, uniform, integrated and accessible. Processing costs will be reduced because good traffic safety data can be merged and integrated efficiently. Therefore, more people will have the capability to use the data, and, with increased use, will become more reliant on the data. This will allow data users to discover more innovative dataset applications and linkages, with the demand for good data increasing over time. This evolutionary process will result in an increase in the usefulness of the data.

As outlined in the Recommendations, the first priorities for development and implementation are **Coordination and Leadership**. Fortunately, these can currently be fostered at State and federal levels using existing resources. The implementation of **Data Quality and Availability, Electronic Technologies and Methods, Uniform and Integrated Data, and Facilitated Data Use** (including training) depends upon the availability, commitment and coordination of resources at both the State and federal levels. Of course, electronic data collection and transfer, and uniform data element names, definitions and attributes must be in place before the data can be integrated and made available in a timely manner to data users.

The implementation of these recommendations in making progress toward the Vision may not be smooth; overlaps and back tracking may be necessary as circumstances affect the level of resources, status of the priorities, and the strength of the interagency collaboration Therefore, national improvement efforts may not be fully realized for many years. In the meantime, however, better traffic safety data will begin to improve identification of effective interventions and strategies, assessment of progress being made, and the determination of what steps remain to be taken to reduce motor vehicle-related fatalities and injuries. Partnerships at the federal, State and local levels with various traffic safety data stakeholders will facilitate progress in the change processes, as we strive together toward a long-term vision of the future of traffic safety data. NHTSA is committed to improving these data to prevent more crashes and save more lives.

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APPENDICES

APPENDIX A-1

Data Integrated Project Team (IPT) Members

DOT Agency	Representative to IPT
National Highway Traffic Safety Administration (NHTSA)	
NHTSA/National Center for Statistics and Analysis	Joseph Carra, (Chairman of Data IPT) Sandy Johnson Ed Milton (Retired December 2003) Dennis Utter,
NHTSA/Office of the Chief Information Officer	Kevin Ball
NHTSA/Advanced Research And Analysis	Peter Martin
NHTSA/Vehicle Safety	Larry Hershman
NHTSA/Regulatory Analysis And Evaluation	Jonathan Walker
NHTSA/Safety Programs	Susan McHenry
NHTSA/Injury Control Operations and Resources	JoAnn Moore
NHTSA/Region 5	Robert Pollack
NHTSA/ Region 7	Bill Reitinger
Bureau of Transportation Statistics (BTS)	
BTS	Lee Franklin
Federal Highway Administration (FHWA)	
FHWA	Tony Aiken
FHWA	John Baxter
FHWA	Michael Halladay
FHWA	Jim Getzewich (Retired December 2003)
Federal Motor Carrier Safety Administration (FMCSA)	
FMCSA	Ralph Craft

APPENDIX A-2

Experts Interviewed By The Data IPT

Organizations/Associations	Persons Interviewed
Advocates for Highway Safety	Jackie Gillan, Henry Jasny
American Assoc. of Motor Vehicle Administrators	Jay Maxwell
Alliance of Automobile Manufacturers	Tom Carr
American Assoc. of State Highway and Transportation Officials	Ken Kobetsky
Ford Motor Company	Kaye Sullivan, Sarah L. Kirks
Governors Highway Safety Assoc.	Barbara Harsha
International Association of Chiefs of Police	Jack Grant, State & Provincial Division of IACP
Insurance Institute for Highway Safety	Sue Ferguson, Anne McCartt
National Safety Council	Chuck Hurley
National Association of State EMS Directors	Beth Armstrong, Greg Mears, Mark King, Jim Craig
Public Citizen	Joan Claybrook, Clarence Ditlow, Laura MacCleery
NHTSA Regional Traffic Records Coordinators	Jack Champlin, Rod Chu, Mario Damiata, Erick Moran, Sami Richie, Gary Taylor, Bill Watada,
Indy Racing League	John Melvin
Traffic Safety Information Systems International Scan Tour	Mike Griffith, Donald MacNamara
STATE TRAFFIC COORDINATING COMMITTEES	
Connecticut TRCC	David Bozac
Indiana TRCC	Robert Zahnke
Iowa TRCC	Mary Jensen, Terry Dillinger,Joyce Emery
Nebraska TRCC	Bob Grant, Fred Zwonechek
ACADEMICIANS	
	Jim Hedlund, consultant
North Carolina	Ron Hughes
University of Miami	Dr. Jeff Augenstein
University of Michigan Transportation Research Institute	Dan Blower, John Woodroffe

APPENDIX B

Traffic Safety Benefits and Costs Saved

ADVANTAGES	KEY CHARACTERISTICS OF "GOOD" DATA	COST SAVINGS
Problems can be identified and fixed sooner. Example: Timely data would have identified the airbag problem sooner and enabled the efficacy of the depowerment countermeasure to be analyzed more quickly. Example: Problem intersections can be identified and countermeasures implemented sooner. **Time saved by law enforcement collecting data can be used for more effective enforcement.** Example: Decisions about revoking a driver's license or impounding a vehicle can be made at the scene. Example: More timely reporting in compliance with state mandates facilitates more timely reporting to the federal databases.	**Timely**	**Consequences of delayed problem identification can be avoided.** Example: Vehicle defects can be identified and corrected in time to prevent crashes and save the costs resulting from property damage, deaths and/or health care occur.
Avoid missing problems or misunderstanding them. Example: GPS latitude and longitude provide the exact location of a crash so that law enforcement and EMS are not delayed in their response.	**Accurate**	**Avoid spending scarce resources on the wrong problem.** Example: Resources are not wasted on the wrong intersection or congested area.
Avoid not knowing about the existence of a problem, and its circumstances. Example: Problems related to non-crash motor vehicle-related deaths, such as child fatalities involving automatic windows, or crash-involved vehicles that are off the roadway, such as parked cars, are not known because only limited data are available. Example: Problems may be known but not all of their circumstances because the sample of available data is too small.	**Complete**	**Avoids wasting resources on standards that miss the mark.**

ADVANTAGES	KEY CHARACTERISTICS OF "GOOD" DATA	COST SAVINGS
Allows data to be merged and linked Example: Uniform data facilitates regional, state and national comparisons to identify best practices. Example: Facilitates use of standardized equipment and data sets for smart cars, bar codes, scanners, etc., for more efficient data collection. Example: Cases will not need to be rejected because of lack of uniformity so the pool of crash data will expand for research studies.	**Uniform**	Save money by not recoding data for merging and linkage. Example: NHTSA avoids the expense of standardizing data submitted by the states participating in its State Data System. **One format is less expensive to implement than multiple formats.** Example: Law enforcement agencies avoid having to purchase different types of equipment to download the same type of data (e.g., EDR).
Provides access to other data sources (license, registration, roadway inventory, medical data, etc.) that are not directly crash-related but important to understanding the crash. Example: Invalid licenses can be quickly identified when law enforcement links at the scene to the state DMV. Example: Crash data can be linked to hospital data to obtain injury outcome information that is not available for law enforcement to collect at the scene. Example: Clues can be collected more effectively to facilitate criminal or terrorist checks for law enforcement and Homeland Security.	**Integrated**	**Value of the existing data is increased through synergistic uses of combined data.** Example: Crash, licensing, registration and citation data provides the capability to identify fraudulent licenses, wanted criminals, stolen vehicles, multiple offenders, etc., integrated for at-scene access provides courts, law enforcement administration, state DOT, DMV with information necessary to take immediate action. Example: Real-time notification of a crash could be integrated into GPS systems that alert drivers to look for alternate routes so motorists can save time and reduce risks from consequences of congestion.
User-friendly access will increase the community of users. Example: Users can save time by processing their own data requests to meet their own needs. **Increased use of the data improves data quality**. Example: NHTSA benefits when users provide informed feedback about problems discovered while researching their specific interests.	**Accessible**	**Users can directly query the data for the information they need when they need it.** Example: Less staff is needed to respond to a data request so personnel costs are saved.

APPENDIX C

ROUTINELY COLLECTED FEDERAL HIGHWAY TRAFFIC SAFETY DATABASES							
Database Name	**Database Description**	**Agency Responsible**	**Data Collection Method**	**Database Size**	**ACCESS**		
					Method	**Restricted**	
						YES	**NO**
FARS – Fatality Analysis Reporting System	FARS contains data on all fatal traffic crashes within the 50 states, the District of Columbia, and Puerto Rico.	NHTSA	Data are collected & entered by analysts located in the 50 States, DC, and Puerto Rico.	38,000 records/year	Web based Data Request CD		√
National Automotive Sampling System (NASS) Crashworthiness Data system (CDS)	Nationally representative, random sample of minor, serious and fatal crashes.	NHTSA	Trained crash investigators obtain data observed at the crash scene, interviews with victims, reviewing medical records, and reconstruction of the passenger cars, light trucks, vans and utility vehicles involved.	5,000 crashes per year	Web based Data Request CD		√
National Automotive Sampling System (NASS) General Estimates System (GES)	Nationally representative, random sample of all types of police reported motor vehicle crashes	NHTSA	Recoded data for trafficway crashes resulting in property damage, injury or death.	50,000 per year	Web based Data Request CD		√

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Database Name	**Database Description**	**Agency Responsible**	**Data Collection Method**	**Database Size**	**ACCESS**		
					Method	**Restricted**	
						YES	**NO**
State Data System (SDS)	Crash data from 24 States converted into 3 separate SAS files: crash, vehicle and person. Each state's variables and values are unique, though there are many common variables and values.	NHTSA	Police Accident Reports (PARs) collected and recorded by participating state agencies.	Large, crash data, from 1989 through 2001. State SAS files—three types per state, per year—vary in size, a few as small 1 MB, though on average 15-20 MB.	SAS files are accessible to NHTSA staff on the LAN. Non-NHTSA requests require from state agencies signed permission letters, before files sent by contractor (VOLPE) for a nominal fee.		
Early Warning Reporting (EWR) System	Early warning system to identify vehicle defects Advanced Retrieval (Tires, Equipment, Motor Vehicles) Information System (ARTEMIS) software	NHTSA	Manufacturers submit data quarterly related to vehicle defects in: -Light Vehicles -Medium-Heavy Vehicles/ Bus -Trailers -Motorcycles -Motor Vehicle Equipment -Child Restraint Systems -Tires for Light Vehicles and Motorcycles	Large databases. Data collection began July 2003. Data submitted via Internet.		√	
NDR - National Driver Register	NDR - is a central repository of information on individuals whose privilege to drive has been revoked, suspended, canceled, or denied, or who have been convicted of a serious traffic-related offense such as a DUI or DWI offense.	NHTSA	The DMVs in all 50 states and the District of Columbia submit data to the NDR. The 50 states and DC also access the NDR database prior to issuing a driver license.	40,000,000 records.		√ Pointer System	

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ROUTINELY COLLECTED FEDERAL HIGHWAY TRAFFIC SAFETY DATABASES							
Database Name	**Database Description**	**Agency Responsible**	**Data Collection Method**	**Database Size**	**ACCESS**		
					Method	**Restricted**	
						YES	**NO**
Special Crash Investigations (SCI)	SCI collects crash data to examine the impact of new, emerging, and changing technologies as this impacts, both negatively and positively, traffic safety.	NHTSA	Data are collected and entered by professional crash investigators.	Varies according to study, but cumulatively, database for a study can exceed 1,000 records.			√
CODES Data Network	Population based, person specific linked data track occupants from the scene, and if injured through the health care system. Injury outcome matched to specific person, vehicle and event characteristics: and to non-crash and administrative data.	NHTSA and State grantee for CODES Data Network 21 CODES / Network states	Probabilistic linkage and imputation techniques to ensure Representativeness of the linked data. All states link crash data to EMS, emergency dept, inpatient, death certificate; some also link to vehicle registration, driver licensing, other traffic records and/or other injury records.	Very large data files vary by total and types of files linked. Include all crash data elements plus all data elements in the linked files. States linked data range from 2 to 10 years since 1992.	Web accessible via state public health based query system. NHTSA analysts access data via NCSA. Fee based access for non-NHTSA staff. Sanitized identifiers; limited access to unit records per signed data release.	√	√
CIREN	Collaborative research involving in-depth studies of crashes, injuries and treatments. Physicians, engineers, sociologists, computer and other experts analyze data on restrained occupants (bag or belt) injured in a motor vehicle crash.	NHTSA	Trained crash investigators, EMS/ED/trauma surgeon medical personnel, sociologists, computer analysts collect and computerized detailed injury outcome information at 10 Level 1 trauma centers.	2,229 cases of which 350 are deaths	Web accessible for sanitized data. Unrestricted access for approved researchers.	√	

APPENDIX C

ROUTINELY COLLECTED FEDERAL HIGHWAY TRAFFIC SAFETY DATABASES							
Database Name	**Database Description**	**Agency Responsible**	**Data Collection Method**	**Database Size**	**ACCESS**		
					Method	**Restricted**	
						YES	**NO**
Highway Statistics	An annual compilation of state-level data summaries. Major data categories include motor fuel use, motor vehicle registrations, driver licensing, highway finance, and roadway characteristics and use (HPMS).	FHWA	Data are collected annually by the states and reported to FHWA	N/A	State-level data summaries are Internet accessible by the public in .xls, .pdf, and .htm formats. Micro (raw) data files are not available to the public.	√	
National Bridge Inventory System (NBIS)	The NBI is the national level compilation of highway bridges in the United States. Inspection and reporting required and regulated by 23 CFR 650C. Data include identification, structure and material type, age and service, geometric data, navigation data, classification, condition ratings, load ratings and posting, appraisal rating, and inspection dates for each highway bridge meets the qualifications in 23 CFR 6540C.	FHWA	Data are collected by the states and reported to FHWA annually. Data are submitted electronically via various media.	Approximately 600,000 records/year.	State level data summaries are Internet accessible in .xls, and .htm formats. State level access and FHWA division level access to the database is available. ASCII flat files containing each state's records on a single CD are available upon request.	√	
Highway Safety Information System (HSIS)	Roadway based system that provides quality data regarding crash, roadway and traffic variables. Contains common identifiers on crashes, roadway inventory, and exposure.	FHWA	California, Illinois, Maine, Michigan, Minnesota, North Carolina, Utah, and Washington provide data to HSIS.	5 million crashes. Inventory and traffic volume approximately 165,000 miles of highway; videodisc photo logs for certain States and GIS applications.	Password Protected	√	

APPENDIX C

ROUTINELY COLLECTED FEDERAL HIGHWAY TRAFFIC SAFETY DATABASES							
Database Name	**Database Description**	**Agency Responsible**	**Data Collection Method**	**Database Size**	**ACCESS**		
					Method	**Restricted**	
						YES	**NO**
Large Truck Crash Causation Study (LTCCS)	Data from large truck crashes collecting from 2001 through 2003.	FMCSA, NHTSA	Data collected at crash scene by NASS researchers and State truck inspectors; and through follow-up phone calls and crash scene visits.	1,000 crashes with close to 1,000 variables on each crash	Data Request purchase		√ -- but crash identifiers eliminated
MCMIS Crash file	Includes 50 data elements on trucks (GVWR or GCWR over 10,000 pounds) and buses (seats for more than 8 people) involved in crashes.	FMCSA	State and local police agencies collect data and forward it electronically to FMCSA.	110,000 truck crashes and 7,000 bus crashes annually	Data Request Purchase database		√ -- except no driver ID
MCMIS Inspection file	Roadside safety inspection electronic data for trucks and buses and their drivers.	FMCSA	FMCSA reimburses states to collect data from vehicle and driver safety inspections of trucks and buses.	2.8 million inspections of trucks and buses annually	Data Request Purchase database		√ -- except no driver ID
MCMIS Compliance file	Electronic data from compliance reviews on motor carriers indicating the degree of carrier compliance with FMCSA safety regulations.	FMCSA	FMCSA field staff conduct compliance reviews (CRs) and report results electronically to FMCSA headquarters.	12,000 CRs annually	Web based Data request CD purchase	√	
MCMIS Enforcement file	Electronic data for enforcement cases against motor carriers, including progress and results.	FMCSA	All enforcement cases	5,000 annually		√ -- only closed cases	

APPENDIX C

ROUTINELY COLLECTED FEDERAL HIGHWAY TRAFFIC SAFETY DATABASES							
Database Name	**Database Description**	**Agency Responsible**	**Data Collection Method**	**Database Size**	**ACCESS**		
					Method	**Restricted**	
						YES	**NO**
MCMIS Census file	Electronic data for all registrations of interstate motor carriers and intrastate Hazardous Material carriers that operate in the US, including Canadian and Mexican carriers.	FMCSA	Carriers submit information to FMCSA when they go into business and then update information every other year.	Data on over 650,000 carriers	Data Request Database purchase On-line		√ -- except no Social Security or tax ID numbers
SAFER	Electronic data on all interstate motor carriers and intrastate carriers of hazardous materials. Data in carrier crash, inspection, and compliance review history.	FMCSA	Data for each carrier is derived from FMCSA's census, crash, inspection, and compliance review databases.	Data on over 650,000 motor carriers	Website		√
Licensing and Insurance	Licensing and Insurance information about authorized for-hire carriers, property brokers, and freight forwarders.	FMCSA	Companies registered with FMCSA file insurance information.	Over 300,000 companies	Website Database Purchase		√
Commercial Driver License Information System (CDLIS)	Driver license and violation data for all holders of Commercial Drivers Licenses (CDL).	FMCSA, American Association of Motor Vehicle Administrators (AAMVA), states	Data collected on all CDL holders sent to state that issued license and placed in files in that state.	Over 9 million CDL holders, but most not currently driving trucks or buses	Data Request Purchase data	√ Electronic Pointer System	

APPENDIX C

ROUTINELY COLLECTED FEDERAL HIGHWAY TRAFFIC SAFETY DATABASES							
Database Name	**Database Description**	**Agency Responsible**	**Data Collection Method**	**Database Size**	**ACCESS**		
					Method	**Restricted**	
						YES	**NO**
Census Population Estimates	This data includes annual estimates of state populations, including details on age, sex, and race as provided by the U.S. Census Bureau. The Census Population Estimates cover all 50 states and the District of Columbia.	BTS via U.S. Census Bureau	Data series for births, deaths, and domestic and international migration are used to update the decennial census base counts.	State Population Records = 184,110 County Population Records = 62,820	**http://www.census.gov**		√
Omnibus Survey	A series of monthly surveys to monitor expectations of and satisfaction with the transportation system and to gather event, issue, and mode-specific information. The surveys provide information for DOT modal administrators to support congressional requests for internal DOT performance indicators.	BTS	Data were collected from households in the U.S. using a Random-Digit-Dialed telephone methodology.	2000-2002 12,000 cases/year 2003 6,000 cases/year	**www.bts.gov** **Type into Search area the words: Omnibus Survey**		√

APPENDIX D

Guidelines For Organization Of A Successful Traffic Records Coordinating Committee (TRCC)

Ensure Membership is Representative: TRCCs should be representative of all stakeholders, and each stakeholder representative must have support from top management. When departments are considering changes to their systems, all TRCC members should be notified and departments should consider how to accommodate the needs of all the TRCC agencies to maintain uniformity.

Authorize Members: The TRCC should have formal standing with the administrations of participating agencies. An empowered TRCC is the mechanism most likely to succeed in overcoming the institutional barriers, lack of focus, and lack of resources that prevent collaboration and progress in integrating highway safety data. The exact role and powers of the TRCC should be made explicit in a TRCC charter. The TRCC should be empowered by legislation and by commitments from the top management of participating agencies so that the members are authorized to make policy decisions and commit their agency resources to resolve problems and carry out the state's strategic plan for Traffic Records. The most important responsibility of the TRCC is to provide the leadership necessary to ensure that available funds are sufficient to match stated needs. Despite challenges of collective decision-making perceived by data owners and managers who come from different agencies with different priorities, TRCC members must be empowered to speak with "one voice."

Appoint an Administrator/Manager: A single point of contact for managing a data improvement project is necessary to ensure leadership. The TRCC should designate a traffic records administrator or manager with sufficient time to do the job. This person will be responsible for coordinating and scheduling the TRCC, in addition to tracking progress implementing the state's traffic records strategic plan. Uniform criteria should be established for monitoring progress. NHTSA could provide training to the administrator/manager and the NHTSA regional data person about traffic record systems, program management, and data analysis.

Schedule Regular Meetings: The TRCC should establish a schedule of regular meetings, not only to discuss data coordination issues and make progress on the strategic plan, but also to share and develop success stories to aid in overcoming fears of implementation. The TRCC needs to gain broader support by marketing the benefits of improved highway safety data; this can be done by providing data and analytical expertise to local government officials, legislators, decision-makers, community groups and all other stakeholders. TRCC meetings can include strategy sessions for such marketing plans.

The following page provides an example of a successful state Traffic Records Coordinating Committee.

Iowa's Statewide Traffic Records Advisory Committee (STRAC)

In 1993, NHTSA solicited 403 proposals from states willing to implement a plan to significantly improve their traffic records systems. The proposal asked states to organize an interdisciplinary coordinating committee, conduct a traffic records assessment and develop a strategic plan. Iowa's two STRAC coordinators reviewed the requirements, developed and submitted an application. Iowa was the first state awarded these funds.

Iowa's STRAC was first convened on June 1, 1994. Members focused on operationalizing NHTSA's concept of an active interdisciplinary coordinating committee, moving Iowa's traffic record's systems forward in the following decade. The committee members matured as a team and worked together in subgroups by e-mail and by face-to-face meetings to accomplish much of the work. The STRAC meetings were seen as occasions for sharing information with the whole committee, making decisions and providing mutual assistance. Eventually, state agency executives began collaborating on traffic records systems providing the necessary top-level support. Leadership from the top and an effective STRAC are essential ingredients in Iowa's success in improving their state traffic records.

Iowa's traffic records plans focused on data collection, storage and use of all the safety data systems. The plan addresses improving the timeliness, accuracy, completeness, integration and accessibility of the systems. Iowa used the most current technology available to improve the collection, housing and use of the data. Through their national model software, the state of Iowa has developed Traffic and Criminal Software (TraCS), achieved economies of scale, developed best practices, standardized policies, and shared software. They have also addressed customers' needs by focusing on institutionalizing their software products into their state's traffic safety data systems. The STRAC also focused on use of the data by developing many analysis tools and providing the data, software and relevant training.

Much of the success of the STRAC goes back to the development process that allowed the committee coordinators to carefully select the members of the committee. They were able to ensure the appropriate people from different state and local agencies were on the committee. They included all the agencies involved in the processes of data collection, storage and use, while obtaining the expertise needed to address system development, communications, programming, analysis, funding and management decision making. In addition to being knowledgeable, the team members were selected because they work well together, show respect for each other, are compatible, diplomatic, dependable and minimized institutional barriers to foster collaboration and cooperation.

STRAC has been successful in breaking down barriers and developing cooperation among agencies at all levels. This opportunity to have the right people on the committee and their cooperation has created a formula for success. Continuing support of the various agencies' leadership allows Iowa's STRAC to remain successful.

APPENDIX E

Acronyms

AAMVA	American Association of Motor Vehicle Administrators
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACN	Automatic Crash Notification
ALAS	Access Accident Location Analysis Software
ANSI	American National Standards Institute
ATSIP	Association of Traffic Safety Information Professionals
BAC	Blood Alcohol Concentration
BTS	Bureau of Transportation Statistics (federal agency)
CDLIS	Commercial Driver Licensing Information System
CETRE	Center for Transportation Research and Education (state of Iowa)
CIREN	Crash Injury Research and Engineering Network (go to NCSA website)
CODES	Crash Outcome Data Evaluation System
CPSC	Consumer Product Safety Commission (federal agency)
CVARS	Commercial Vehicle Analysis Reporting System
DMV	Department of Motor Vehicles
DOT	Department of Transportation
DPS	Department of Public Safety
EDR	Event Data Recorder
EMS	Emergency Medical Services
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration (federal agency)
FMCSA	Federal Motor Carrier Safety Administration (federal agency)
GAO	Government Accounting Office
GHSA	Governors Highway Safety Association
GPS/GIS	Global Positioning System/Geographic Information System
HSIS	Highway Safety Information System
HSP	Highway Safety Plan
IACP	International Association of Chiefs of Police
IPT	Integrated Project Team
IPTM	Institute of Police Technology and Management
ISTEA	Intermodal Surface Transportation and Efficiency Act of 1991
ITE	Institute of Transportation Engineers
KABCO	Fatal Injury (K), Incapacitating Injury (A), Non-Incapacitating Injury (B), Possible Injury (C), No Injury (O)
LETN	Law Enforcement Training Network
MCMIS	Motor Carrier Management Information System
MDT	Mobile Data Terminal
MMUCC	Model Minimum Uniform Crash Criteria
NASS-CDS	National Automotive Sampling System Crashworthiness Data System

NASS-GES	National Automotive Sampling System General Estimates System
NCIC	National Crime Information Center
NCSA	National Center for Statistics and Analysis
NEISS	National Electronic Injury Surveillance System
NEMSIS	National EMS Information System
NLETS	National Law Enforcement Telecommunications System
NHTSA	National Highway Traffic Safety Administration
NOPUS	National Occupant Protection Use Survey
PDA	Personal Data Assistant
PDO	Property Damage Only
PDPS	Problem Driver Pointer System
SAE	Society of Automotive Engineers
SAFETEA	Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2003
SAS	Statistical Analysis System (patented statistical software package)
SCI	Special Crash Investigations
SDS	State Data System
SHSO	State Traffic Safety Organization
STRAC	Statewide Traffic Records Advisory Committee (Iowa)
TEA21	Transportation Equity Act for the 21st Century
TraCS	Traffic and Criminal Software (Iowa)
TSI	Transportation Safety Institute
TSIS	Traffic Safety Information System
TRCC	Traffic Records Coordinating Committee
US DOT	United States Department of Transportation
XML	Extensible Markup Language